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## Map of the Campus of LEHIGH UNIVERSITY

1. Alumni Memorial Building
2. Packard Laboratory
3. Packer Memorial Chapel
4. Christmas-Saucon Hall
5. Physics Laboratory
6. Shops
7. Power House
8. Physics Building
9. Chemistry Building
10. Williams Hall
11. Library
12. Mining Engineering
13. Geology Hall
14. Armory
15. Drown Hall
16. Peacock Hall
17. Residence Home
18. Taylor Stadium
19. Taylor Gymnasium
20. Faculty Reses. Price House
21. Delta Kappa Delta
22. Charles Lewis Taylor House
23. Sigma Nu
24. Sigma Phi Epsilon
25. Psi Upsilon
26. Phi Delta Theta
27. Theta Delta Chi
28. Beta Theta Pi
29. Gamma Tau Omega
30. Chi Psi
31. Phi Gamma Delta
32. Sigma Phi
33. Suys Astronomical Observatory
34. Charles Russ Richards House
35. Henry Sturgis Drinker House
- F. Faculty Residence



# Lehigh University Publication

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VOL. 19

MARCH, 1945

No. 1

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REGISTER, 1944-1945

ANNOUNCEMENT, 1945-1946



BETHLEHEM, PENNSYLVANIA

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## LEHIGH UNIVERSITY

1944							1945							1946						
JULY							JANUARY							JULY						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
..	..	..	..	..	..	1	..	1	2	3	4	5	6	1	2	3	4	5	6	7
2	3	4	5	6	7	8	7	8	9	10	11	12	13	8	9	10	11	12	13	14
9	10	11	12	13	14	15	14	15	16	17	18	19	20	15	16	17	18	19	20	21
16	17	18	19	20	21	22	21	22	23	24	25	26	27	22	23	24	25	26	27	28
23	24	25	26	27	28	29	28	29	30	31	..	..	..	29	30	31	..	..	..	..
30	31	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
AUGUST							FEBRUARY							AUGUST						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
..	..	1	2	3	4	5	..	..	1	2	3	..	..	..	..	..	1	2	3	4
6	7	8	9	10	11	12	4	5	6	7	8	9	10	5	6	7	8	9	10	11
13	14	15	16	17	18	19	11	12	13	14	15	16	17	12	13	14	15	16	17	18
20	21	22	23	24	25	26	18	19	20	21	22	23	24	19	20	21	22	23	24	25
27	28	29	30	31	..	..	25	26	27	28	..	..	..	26	27	28	29	30	31	..
SEPTEMBER							MARCH							SEPTEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
..	..	1	2	3	4	5	..	..	1	2	3	..	..	..	..	..	1	2	3	4
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29
OCTOBER							APRIL							OCTOBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
1	2	3	4	5	6	7	1	2	3	4	5	6	7	..	1	2	3	4	5	6
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27
29	30	31	..	..	..	..	29	30	..	..	..	..	..	28	29	30	31	..	..	..
NOVEMBER							MAY							NOVEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	..	1	2	3	4
5	6	7	8	9	10	11	6	7	8	9	10	11	12	4	5	6	7	8	9	10
12	13	14	15	16	17	18	13	14	15	16	17	18	19	11	12	13	14	15	16	17
19	20	21	22	23	24	25	20	21	22	23	24	25	26	18	19	20	21	22	23	24
26	27	28	29	30	..	..	27	28	29	30	31	..	..	25	26	27	28	29	30	31
DECEMBER							JUNE							DECEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
3	4	5	6	7	8	9	3	4	5	6	7	8	9	2	3	4	5	6	7	8
10	11	12	13	14	15	16	10	11	12	13	14	15	16	9	10	11	12	13	14	15
17	18	19	20	21	22	23	17	18	19	20	21	22	23	16	17	18	19	20	21	22
24	25	26	27	28	29	30	24	25	26	27	28	29	30	23	24	25	26	27	28	29
31	..	..	..	..	..	..	..	..	..	..	..	..	..	30	31	..	..	..	..	..
JUNE							DECEMBER							JUNE						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8
10	11	12	13	14	15	16	10	11	12	13	14	15	16	9	10	11	12	13	14	15
17	18	19	20	21	22	23	17	18	19	20	21	22	23	16	17	18	19	20	21	22
24	25	26	27	28	29	30	24	25	26	27	28	29	30	23	24	25	26	27	28	29
31	..	..	..	..	..	..	..	..	..	..	..	..	..	30	31	..	..	..	..	..

UNIVERSITY CALENDAR

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UNIVERSITY CALENDAR

1944-1945

1944

June 21 (Wed.) . . . . .	Undergraduate registration
June 22 (Thurs.) . . . . .	Summer Semester begins
June 22, 23, 24 (Thurs.-Sat.) . . . . .	Graduate registration
June 22 (Thurs.) . . . . .	Evening courses begin
June 26 (Mon.) . . . . .	Six weeks Summer Semester begins
August 5 (Sat.) . . . . .	Six weeks Summer Semester ends
August 7 (Mon.) . . . . .	Post Session ends
August 17 (Thurs.) . . . . .	Mid-semester reports
August 26 (Sat.) . . . . .	Post Session begins
September 25, 4:30 p.m. (Mon.) . . . . .	Last day for filing applications for degrees to be conferred on Founder's Day
October 4 (Wed.) . . . . .	Instruction ends
October 5 (Thurs.) . . . . .	Examinations begin
October 11 (Wed.) . . . . .	Examinations end
October 15 (Sun.) . . . . .	Founder's Day
October 18 (Wed.) . . . . .	Registration for Fall Semester
October 19 (Thurs.) . . . . .	Fall Semester begins
November 23 (Thurs.) . . . . .	Thanksgiving Day
December 14 (Thurs.) . . . . .	Mid-semester reports
December 23, 12:00 m. (Sat.) . . . . .	Christmas holidays begin

1945

January 2, 8:10 a.m. (Tues.) . . . . .	Christmas holidays end
January 15, 4:30 p.m. (Mon.) . . . . .	Last day for filing applications for degrees to be conferred at Midyear Commencement
February 7 (Wed.) . . . . .	Instruction ends
February 8 (Thurs.) . . . . .	Examinations begin
February 14 (Wed.) . . . . .	Examinations end
February 18 (Sun.) . . . . .	Midyear Commencement
February 21 (Wed.) . . . . .	Registration for Spring Semester
February 22 (Thurs.) . . . . .	Spring Semester begins
April 19 (Thurs.) . . . . .	Mid-semester reports
May 15 (Tues.) . . . . .	Last day for filing applications for degrees to be conferred on University Day
June 6 (Wed.) . . . . .	Instruction ends
June 7 (Thurs.) . . . . .	Examinations begin
June 13 (Wed.) . . . . .	Examinations end
June 17 (Sun.) . . . . .	University Day
June 20 (Wed.) . . . . .	Registration for Summer Semester
June 21 (Thurs.) . . . . .	Summer Semester begins
June 25 (Mon.) . . . . .	Summer Session begins
August 4 (Sat.) . . . . .	Summer Session ends
August 6 (Mon.) . . . . .	Post-session begins
August 16 (Thurs.) . . . . .	Mid-semester reports
August 25 (Sat.) . . . . .	Post-session ends
September 25, 4:30 p.m. (Tues.) . . . . .	Last day for filing applications for degrees to be conferred at Midyear Commencement
October 3 (Wed.) . . . . .	Instruction ends
October 4 (Thurs.) . . . . .	Examinations begin
October 10 (Wed.) . . . . .	Examinations end
October 14 (Sun.) . . . . .	Founder's Day

LEHIGH UNIVERSITY

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UNIVERSITY CALENDAR—Continued

1945-1946

October 17 (Wed.)	Registration for Fall Semester
October 18 (Thurs.)	Fall Semester begins
November 22 (Thurs.)	Thanksgiving Day
December 13 (Thurs.)	Mid-semester reports
December 22, 12:00 m. (Sat.)	Christmas holidays begin
December 31 (Mon.)	Christmas holidays end

1946

January 15, 4:30 p.m. (Tues.)	Last day for filing applications for degrees to be conferred at Midyear Commencement
February 6 (Wed.)	Instruction ends
February 7 (Thurs.)	Examinations begin
February 13 (Wed.)	Examinations end
February 17 (Sun.)	Midyear Commencement
February 20 (Wed.)	Registration for Spring Semester
February 21 (Thurs.)	Spring Semester begins
April 18 (Thurs.)	Mid-semester reports
May 15 (Wed.)	Last day for filing applications for degrees to be conferred on University Day
June 5 (Wed.)	Instruction ends
June 6 (Thurs.)	Examinations begin
June 12 (Wed.)	Examinations end
June 16 (Sun.)	University Day

BOARD OF TRUSTEES

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BOARD OF TRUSTEES

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ROBERT CLEMENT WATSON, 1946 Washington, D. C.  
C.E., LL.B.  
Class of 1913  
ALFRED VANSANDT BODINE, M.E. 1947 Bridgeport, Conn.  
Class of 1915  
STEWART JOSEPH CORT, El.Met. 1948 Sparrows Point, Md.  
Class of 1906  
JAMES HARVEY PIERCE, E.M. 1949 Scranton, Pa.  
Class of 1910  
NEVIN ELWELL FUNK, E.E., Eng.D. 1950 Philadelphia, Pa.  
Class of 1905

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\* Died, September 15, 1944.

LEHIGH UNIVERSITY

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WILLIAM C. DICKERMAN

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ALFRED V. BODINE

†JOHN I. KIRKPATRICK, *Secretary*

R. S. TAYLOR, SR., *Acting Secretary*

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\* Died, September 15, 1944.

† On leave of absence

‡ Acting

FACULTY

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## UNIVERSITY FACULTY

(The first date after the name indicates date of first appointment to continuous service on the faculty; the second date, when the first fails to do so, indicates the date of appointment to present classification as to professorial rank.)

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CLEMENT CLARENCE WILLIAMS (1935) ..... *President*  
B.S., Southern Illinois Normal School, 1900; B.S. in C.E., Illinois, 1907;  
C.E., Colorado, 1939; LL.D. (Hon.), Lafayette, 1935; Eng.D. (Hon.),  
Northeastern, 1936; Eng.D. (Hon.), Bucknell, 1937; Sc.D. (Hon.),  
Hahnemann Medical College, 1938.

### PROFESSORS EMERITUS

SYLVANUS A. BECKER (1906, 1944) ..... *Associate Professor Emeritus  
of Civil Engineering*  
C.E., Lehigh, 1903; M.S., 1909.

RAYMOND COOLEY BULL (1923, 1944) ..... *Director Emeritus of Students'  
Health Service*  
B.S., Colorado College, 1904; A.B., Kansas, 1906; M.D., Jefferson Medical  
College, 1909.

THOMAS EDWARD BUTTERFIELD (1912, 1944) ..... *Professor of Heat Power  
Engineering*  
M.E., Stevens Institute of Technology, 1895; C. E., Rensselaer Polytechnic,  
1897.

HOWARD ECKFELDT (1900, 1942) ..... *Professor Emeritus of Mining  
Engineering*  
B.S., Lehigh, 1895; E.M., 1896.

ROBERT WILLIAM HALL (1902, 1942) ..... *Professor Emeritus of Biology*  
Ph.E., Yale, 1895; B.A., Harvard, 1897; M.A., 1898; Ph.D., 1901.

PERCY HUGHES (1907, 1942) ..... *Professor Emeritus of Philosophy*  
A.B., Alfred, 1899; A.M., Columbia, 1902; Ph.D., 1904.

JOHN HUTCHESON OGBURN (1895, 1939) ..... *Professor Emeritus of  
Mathematics and Astronomy*  
C.E., Vanderbilt, 1892.

HOWARD ROLAND REITER (1911, 1941) ..... *Professor Emeritus of  
Physical Education*  
B.A., Princeton, 1898; M.A., 1900.

BRADLEY STOUGHTON (1923, 1944) ..... *Professor Emeritus of Metallurgy*  
Ph.B., Yale, 1893; B.S., Massachusetts Institute of Technology, 1896.

†CHARLES LEWIS THORNBURG (1805, 1925) ..... *Professor Emeritus of  
Mathematics and Astronomy*  
B.S., Vanderbilt, 1881; B.E., 1882; C.E., 1883; Ph.D., 1884; LL.D.  
(Hon.), Lehigh, 1925.

HARRY MAAS ULLMANN (1894, 1938) ..... *Professor Emeritus of Chemistry  
and Chemical Engineering*  
A.B., John Hopkins, 1889; Ph.D., 1892.

### PROFESSORS

HAROLD VICTOR ANDERSON (1918, 1941) ..... *Professor of Chemistry*  
B.Ch.E., Michigan, 1912; M.S., Lehigh, 1925.

\* Absent on leave.

† Died October 14, 1944.

LEHIGH UNIVERSITY

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ALLEN JENNINGS BARTHOLD (1939) ....*Professor of Romance Languages, Head of the Department of Romance Languages*  
B.A., Lehigh, 1921; Ph.D., Yale, 1931.

\*PAUL LEVERNE BAYLEY (1927, 1937) .....*Professor of Physics*  
B.A., Arkansas, 1913; M.A., Illinois, 1914; Ph.D., Cornell, 1923.

CLAUDE GILLETTE BEARDSLEE (1931) .....*Professor of Moral and Religious Philosophy, Head of the Department of Moral and Religious Philosophy, Chaplain of the University*  
B.A., Yale, 1909; B.D., Hartford Theological Seminary, 1912; S.T.M., 1913; M.A., Southern California, 1922; Ph.D., Brown, 1931.

JACOB LYNFORD BEAVER (1917, 1931) .....*Professor of Electrical Engineering, Acting Head of the Department of Electrical Engineering, Acting Director of the Curriculum in Electrical Engineering*  
E.E., Lehigh, 1904; M.S., 1921; Sc.D., Harvard, 1932.

\*LOYAL VIVIAN BEWLEY (1940) .....*Professor of Electrical Engineering, Head of the Department of Electrical Engineering, Director of the Curriculum in Electrical Engineering*  
B.S. in E.E., Washington, 1923; M.S., Union College, 1928.

CHARLES CLARENCE BIDWELL (1927) .....*Professor of Physics, Head of the Department of Physics, Director of the Curriculum in Engineering Physics*  
A.B., Rochester, 1904; Ph.D., Cornell, 1914.

FREDERICK ALDEN BRADFORD (1926, 1935) .....*Professor of Economics, Head of the Department of Finance*  
A.B., Michigan, 1921; M.A., 1923; Ph.D., 1926.

\*ELMER CLARK BRATT (1929, 1941) .....*Professor of Economics*  
A.B., Nebraska, 1925; A.M., 1926; Ph.D., Wisconsin, 1935.

ALLISON BUTTS (1916, 1938) .....*Professor of Electrometallurgy*  
A.B., Princeton, 1911; B.S., Massachusetts Institute of Technology, 1913.

ALFRED COPELAND CALLEN (1939) .....*Professor of Mining Engineering, Head of the Department of Mining Engineering, Director of the Curriculum in Mining Engineering, Dean of the College of Engineering*  
E.M., Lehigh, 1909; M.S., 1911.

NEIL CAROTHERS (1923) .....*Macfarlane Professor of Economics, Dean of the College of Business Administration*  
B.A., Arkansas, 1905; Dip. in Econ., Oxford, 1907; Ph.D., Princeton, 1916.

WRAY HOLLOWELL CONGDON (1934) .....*Professor of Education, Acting Head of the Department of Education, Dean of Undergraduates*  
A.B., Syracuse, 1914; M.A., (Engl.) 1915; M.A., (Ed.), Michigan, 1922; Ph.D., 1929.

ROY BURFORD COWIN (1924) .....*Professor of Accounting, Head of the Department of Accounting*  
A.B., Michigan, 1916; M.A., 1918.

\*EARL LEVERNE CRUM (1929, 1941) .....*Professor of Greek, Head of the Department of Greek*  
A.B., St. John's (Annapolis), 1913; A.M., Johns Hopkins, 1916; Ph.D., New York, 1924.

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\* Absent on leave.

FACULTY

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GEORGE BARTLETT CURTIS (1920, 1928) .... *Registrar and University Editor*  
A.B., Wesleyan, 1916; A.M., Columbia, 1923.

HERBERT MAYNARD DIAMOND (1927) .... *Professor of Economics, Head of  
the Department of Economics and Sociology*  
B.A., Yale, 1914; Ph.D., 1917.

ALPHA ALBERT DIEFENDERFER (1902, 1930) .... *Professor of Assaying  
B.S., in Chem., Lehigh, 1902; M.S., 1908. and Quantitative Analysis*

GILBERT EVERETT DOAN (1926, 1937) .... *Professor of Metallurgy,  
Head of the Department of Metallurgical Engineering, Director of  
the Curriculum in Metallurgical Engineering*  
Ch.E., Lehigh, 1919; Ph.D., Berlin, 1926.

GEORGE WINSHIP EASTERDAY (1944) .... *Professor of Military  
Science and Tactics*  
B.S. in EE., George Washington University, 1909; Colonel, U.S.A.

\*WARREN WALTER EWING (1920, 1937) .... *Professor of Physical Chemistry*  
B.S., Parsons, 1912; M.S., Chicago, 1918; Ph.D., 1920.

\*ADELBERT FORD (1931) .... *Professor of Psychology, Head of the  
Department of Psychology*  
A.B., Michigan, 1920; A.M., 1923; Ph.D., 1926.

TOMLINSON FORT (1927) .... *Professor of Mathematics, Head of the  
Department of Mathematics and Astronomy, Dean of the Graduate  
School*  
A.B., Georgia, 1906; A.M., 1909; A.M., Harvard, 1910; Ph.D., 1912.

LAWRENCE HENRY GIPSON (1924) .... *Professor of History and Government,  
Head of the Department of History and Government*  
A.B., Idaho, 1903; B.A., Oxford, 1907; Ph.D., Yale, 1918; F.R., Hist. S.

\*GLEN WALTER HARMESON (1934, 1939) .... *Professor of Physical Education,  
Director of Intercollegiate Athletics*  
B.S., Purdue, 1930.

GEORGE DEWEY HARMON (1925, 1942) .... *Professor of American History*  
B.A., Duke, 1921; M.A., 1922; Ph.D., Pennsylvania, 1930.

ARTHUR WARNER KLEIN (1904, 1915) .... *Professor of Mechanical  
Engineering*  
M.E., Lehigh, 1899.

FRED VIALL LARKIN (1912, 1919) .... *Professor of Mechanical Engineering,  
Head of the Department of Mechanical Engineering, Director of the  
Curricula in Mechanical Engineering and Industrial Engineering*  
B.S., Wisconsin, 1906; M.E., 1915.

HOWARD SEAVOY LEACH (1924) .... *Librarian*  
A.B., Wesleyan, 1913; M.A., Princeton, 1915.

†BENJAMIN LEROY MILLER (1907) .... *Professor of Geology*  
A.B., Kansas, 1897; A.M., Penn College, 1898; Ph.D., Johns Hopkins, 1903.

ROBERT PATTISON MORE (1916, 1942) .... *Professor of German,  
Executive Secretary of the Graduate Faculty*  
B.A., Lehigh, 1910; M.A., Harvard, 1913.

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\*Absent on leave.

† Died, March 23, 1944.

LEHIGH UNIVERSITY

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HARVEY ALEXANDER NEVILLE (1927, 1938).....*Professor of Chemistry and Chemical Engineering, Head of the Department of Chemistry and Chemical Engineering, Director of the Curricula in Chemistry and Chemical Engineering*  
A.B., Randolph-Macon, 1918; M.A., Princeton, 1920; Ph.D., 1921.

PHILIP MASON PALMER (1902, 1906).....*Professor of German, Head of the Department of German, Dean of the College of Arts and Science*  
A.B., Bowdoin, 1900; A.B., Harvard, 1902; D.h.c., Litt.D.

JOSEPH BENSON REYNOLDS (1907, 1927)....*Professor of Mathematics and Theoretical Mechanics*  
B.A., Lehigh, 1907; M.A., 1910; Ph.D., Moravian, 1919.

JONATHAN BURKE SEVERS (1927, 1941).....*Professor of English*  
A.B., Rutgers, 1925; A.M., Princeton, 1927; Ph.D., Yale, 1935.

THOMAS EDGAR SHIELDS (1905, 1937).....*Professor of Music, Head of A.A.G.O., 1918; Mus.D., Muhlenberg, 1935. the Department of Music*

CHARLES WELLINGTON SIMMONS (1928, 1940).....*Professor of Chemical B.Sc., Queen's, 1920; M.S., Lehigh, 1928. Engineering*

\*LLOYD LEROY SMAIL (1926, 1929).....*Professor of Mathematics*  
A.B., Washington, 1911; A.M., 1912; Ph.D., Columbia, 1913.

EARL KENNETH SMILEY (1934, 1938).....*Director of Admissions Acting Director of the Summer Session*  
A.B., Bowdoin, 1921; M.A., Lehigh, 1935.

ROBERT METCALF SMITH (1925).....*Professor of English, Head of the Department of English*  
A.B., Amherst, 1908; A.M., Columbia, 1909; Ph.D., 1915.

MILTON CALEB STUART (1926).....*Professor of Mechanical Engineering*  
B.S. in M.E., Pennsylvania, 1909; M.E., 1924.

HALE SUTHERLAND (1930).....*Professor of Civil Engineering, Head of the Department of Civil Engineering, Director of the Curriculum in Civil Engineering, Director of Fritz Laboratory*  
A.B., Harvard, 1906; S.B., Massachusetts Institute of Technology, 1911.

EDWIN RAYMOND THEIS (1927, 1938).....*Professor of Chemical Ch.E., Cincinnati, 1921; Ph.D., 1926. Engineering*

\*HAROLD PRESCOTT THOMAS (1932).....*Professor of Education, Head of the Department of Education, Director of the Summer Session*  
B.S., Colgate, 1920; Ed.M., Harvard, 1925; Ed.D., 1932.

STANLEY JUDSON THOMAS (1923, 1928).....*Professor of Bacteriology Head of the Department of Biology*  
B.S., Lafayette, 1912; M.S., Lehigh, 1913; M.A., 1916; Ph.D., Pennsylvania, 1928.

BRADFORD WILLARD (1939).....*Professor of Geology, Head of the Department of Geology*  
B.A., Lehigh, 1921; A.M., Harvard, 1922; Ph.D., 1923

\*HORACE WETHERILL WRIGHT (1921, 1923).....*Professor of Latin, Head of the Department of Latin*  
A.B., Wisconsin, 1908; Ph.D., Pennsylvania, 1917.

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\*Absent on leave.

FACULTY

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ASSOCIATE PROFESSORS

CARL ELMER ALLEN (1930, 1939).....*Associate Professor of Accounting,  
Active Assistant Treasurer*  
B.S., Illinois, 1923; M.S., 1925; Ph.D., 1930; C.P.A., Pennsylvania, 1939.

EDWARD DELBERT AMSTUTZ (1938, 1943).....*Associate Professor of  
Organic Chemistry*  
B.S., College of Wooster, 1930; M.S., Institute of Paper Chemistry, 1932;  
Ph.D., Cornell, 1936

FRANK CHESTER BECKER (1927, 1942).....*Stewardson Associate  
Professor of Philosophy, Chairman of the Department of Philosophy*  
A.B., Wesleyan, 1905.

\*WALLACE ROBERT BIGGS (1942).....*Associate Professor of Journalism*  
A.B., Drury College, 1926; M.A., Washington University, 1927; Ph.D.,  
Northwestern, 1933.

ROBERT DOMINICK BILLINGER (1929, 1939).....*Associate Professor of  
Ch.E., Lehigh, 1921; M.S., 1925; Ph.D., Cincinnati, 1929. Chemistry*

CORNELIUS GODFREY BRENNEMECKE (1942).....*Associate Professor of  
Electrical Engineering*  
A.B., Columbia, 1926; B.S., Columbia, School of Engineering, 1927; E.E.,  
Columbia School of Engineering, 1928; Ph.D., New York University, 1936.

\*PRESTON BANKS CARWILE (1927, 1931)....*Associate Professor of Physics*  
A.B., Davidson, 1920; M.A., Virginia, 1924; Ph.D., 1927.

ELLIOTT WARD CHENNEY (1942).....*Associate Professor of Physics*  
A.B., Dartmouth College, 1920; Ph.D., Princeton University, 1926.

JAMES LOWRY CLIFFORD (1937, 1942).....*Associate Professor of English*  
A.B., Wabash College, 1923; B.S., Massachusetts Institute of Technology,  
1925; A.M., Columbia, 1932; Ph.D., 1941.

\*JOHN ROBERT CONNELLY (1929, 1938).....*Associate Professor of  
Industrial Engineering*  
B.S. in M.E., Illinois, 1927; M.S., 1929; M.A., Lehigh, 1934; M.E., Illinois,  
1940.

WILLIAM JOSEPH ENEY (1936, 1941).....*Associate Professor of  
Civil Engineering*  
B.E., Johns Hopkins, 1927; M.S., Lehigh, 1938.

AUGUSTUS HENRY FRETZ (1918, 1933).....*Associate Professor of Geology*  
Ph.B., Lafayette, 1903; C.E., 1906; M.S., 1924.

\*AUSTIN ROGERS FREY (1929)....*Associate Professor of Physics*  
S.B., Harvard, 1920; M.A., 1924; Ph.D., 1929.

\*JOHN H. FRYE (1935, 1943).....*Associate Professor of Metallurgy*  
A.B., Howard, 1930; M.S., Lehigh, 1934; Ph.D., Oxon, 1942.

MERTON OTIS FULLER (1912, 1922).....*Associate Professor of Civil  
Engineering*  
C.E., Syracuse, 1910; M.S., Lehigh, 1934.

\*WILSON LEON GODSHALL (1939, 1940).....*Associate Professor of  
Diplomatic History and International Relations*  
B.S., Pennsylvania, 1919; A.M., 1920; Ph.D., 1923; Director of Institute  
of Politics, 1943.

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\*Absent on leave.

LEHIGH UNIVERSITY

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JAMES LARMOUR GRAHAM (1930, 1938) .... *Associate Professor of Psychology, Acting Head of the Department of Psychology*  
B.A., Muskingum, 1911; B.D., Union Theological Seminary, 1922; M.A., Columbia, 1922; Ph.D., Peabody, 1927.

THOMAS HUGER HAZLEHURST (1927, 1939) .... *Associate Professor of Chemistry*  
A.B., College of Charleston, 1923; Ph.D., Johns Hopkins, 1927.

GARTH AHYMAN HOWLAND (1927, 1933) .... *Associate Professor of Fine Arts, Head of the Department of Fine Arts*  
B.A., North Dakota, 1912; M.A., Harvard, 1930.

\*CYRIL DEWEY JENSEN (1925, 1937) .... *Associate Professor of Civil Engineering*  
B.S. in C.E., Minnesota, 1921; C.E., 1930; M.S., Lehigh, 1929.

\*BRUCE GILBERT JOHNSTON (1938, 1941) .... *Associate Professor of Civil Engineering, Associate Director of Fritz Laboratory*  
B.S. in C.E., Illinois, 1930; M.S., Lehigh, 1934; Ph.D., Columbia, 1938.

\*HENRY CARL IVAR KNUTSON (1930, 1939) .... *Associate Professor of E.E., Brooklyn Polytechnic, 1929; M.E.E., 1931. Electrical Engineering*

KENNETH WORCESTER LAMSON (1926, 1930) .... *Associate Professor of Mathematics*  
A.B., Harvard, 1906; Ph.D., Chicago, 1917.

\*CHARLES ROZIER LARKIN (1929, 1937) .... *Associate Professor of Physics*  
B.A., Virginia, 1923; M.A., 1925; Ph.D., 1929.

ARCHIE ROSCOE MILLER (1922, 1938) .... *Associate Professor of Electrical Engineering*  
B.S. in E.E., Illinois, 1918; M.S., Lehigh, 1925.

HARRY GORDON PAYROW (1916, 1942) .... *Associate Professor of Sanitary Engineering*  
B.S. in C.E., Tufts, 1907.

GEORGE EMIL RAYNOR (1931, 1935) .... *Associate Professor of Mathematics*  
B.S., Washington, 1918; M.A., Princeton, 1920; Ph.D., 1923.

EDGAR HEISLER RILEY (1926, 1931) .... *Associate Professor of English*  
A.B., Cornell, 1915; Ph.D., 1925.

ERNST BERNHARD SCHULZ (1927, 1931) .... *Associate Professor of Political Science*  
B.S., Michigan, 1920; M.A., 1921; Ph.D., 1927.

EARL JAMES SERFASS (1936, 1943) .... *Associate Professor of Chemistry*  
B.S. in Ch.E., Lehigh, 1933; M.S., 1935; Ph.D., 1938.

CLARENCE ALBERT SHOOK (1930, 1935) .... *Associate Professor of Mathematics*  
A.B., Western Reserve, 1916; A.M., Harvard, 1918; Ph.D., Johns Hopkins, 1928.

\*RAFAEL ARCÁNGEL SOTO (1925, 1943) .... *Associate Professor of Romance Languages*  
B.S., Illinois, 1912; B.A., 1915; M.A., 1917.

DUNCAN STEWART, JR. (1941, 1943) .... *Associate Professor of Geology*  
B.S., University of Michigan, 1928; Sc.M., Brown University, 1930; Ph.D., University of Michigan, 1933.

FRANCIS JOHN TREMBLEY (1928, 1941) .... *Associate Professor of Biology*  
B.S., Hobart College, 1928; M.S., Lehigh, 1931; Ph.D., Pennsylvania, 1940.

LAWRENCE WHITCOMB (1930, 1939) .... *Associate Professor of Geology*  
Ph.B., Brown, 1922; A.M., Princeton, 1928; Ph.D., 1930.

\*Absent on leave

FACULTY

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ASSISTANT PROFESSORS

\*WILLIAM APPLETON AIKEN (1941).....*Assistant Professor of History*  
B.A., Yale, 1929; M.Litt., Cambridge (England), 1932; Ph.D., Yale, 1939.

FAY CONANT BARTLETT (1917, 1921).....*Assistant Professor and Director  
of Physical Education*

\*FRANK SWAN BEALE (1930, 1935)....*Assistant Professor of Mathematics*  
B.S., Maine, 1921; M.S., 1928; Ph.D., Michigan, 1931.

GEORGE CARLTON BECK (1904, 1913).....*Assistant Professor of Quantitative Analysis*  
A.C., Lehigh, 1903.

\*PETER GABRIEL BERGMANN (1942).....*Assistant Professor of Physics*  
Sc.D., University of Prague, 1936.

\*CLEO BRUNETTI (1937, 1939).....*Assistant Professor of Electrical Engineering*  
B.E.E., Minnesota, 1932; Ph.D., 1937.

\*ROBERT DEXTER BUTLER (1936, 1939)....*Assistant Professor of Geology*  
S.B., Massachusetts Institute of Technology, 1932; Ph.D., 1936.

\*JOSEPH CALVIN CALLAGHAN (1936, 1939).....*Assistant Professor of English and Speech*  
A.B., Michigan, 1931; M.A., 1932.

GLENN JAMES CHRISTENSEN (1939, 1942).....*Assistant Professor of English*  
B.A., College of Wooster, 1935; Ph.D., Yale, 1939.

\*EDWARD HUTCHINS CUTLER (1930, 1940).....*Assistant Professor of Mathematics*  
A.B., Harvard, 1925; A.M., 1926; Ph.D., 1930.

\*CLARENCE DANHOF (1937, 1941).....*Assistant Professor of Economics*  
A.B., Kalamazoo College, 1932; M.A., Michigan, 1933; Ph.D., 1939.

\*FREDERIC PHILIP FISCHER (1942).....*Assistant Professor of Electrical Engineering*  
B.Sc., in E.E., Rutgers University, 1932; M.Sc. in E.E., Lehigh University, 1936.

\*FRANK JUNIOR FORNOFF (1940, 1942).....*Assistant Professor of Chemistry*  
A.B., University of Illinois, 1936; M.Sc., Ohio State, 1937; Ph.D., 1939.

JOSEPH WILLIAM FOSTER, JR. (1942, 1944).....*Assistant Professor of Military Science*  
B.S. in Bus. Adm., Texas A. and M., 1936; Captain, U.S.A.Res.

ROBERT TAYLOR GALLAGHER (1942).....*Assistant Professor of Mining Engineering*  
B.S., Pennsylvania State College, 1927; M. A., University of Missouri School of Mines, 1938; D.Eng., Colorado School of Mines, 1941.

HOWARD DIETRICH GRUBER (1914, 1918).....*Assistant Professor of Electrical Engineering*  
E.E., Lehigh, 1909; M.S., 1923.

\*BYRON CROMWELL HAYES (1941).....*Assistant Director of Admissions*  
B.E., Illinois State Teachers College, 1935; M.A., University of Chicago, 1938.

ARTHUR THOMAS IPPEN (1938, 1939).....*Assistant Professor of Civil Engineering*  
Dipl. Ing., Technische Hochschule, Aachen, Germany, 1931; M.S., California Institute of Technology, 1935; Ph.D., 1936.

\*Absent on leave

LEHIGH UNIVERSITY

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\*THOMAS EDGAR JACKSON (1937, 1942).....*Assistant Professor of Mechanical Engineering*  
B.S., in M.E., Carnegie Institute of Technology, 1934; M.S., Lehigh, 1937.

\*WILLIAM LEROY JENKINS (1935, 1939).....*Assistant Professor of Psychology*  
B.S. in Chem., Brooklyn Polytechnic Institute, 1921; M.A., Michigan, 1932; Ph.D., 1936.

\*THOMAS FREDERICK JONES (1939) ....*Assistant Professor of Economics*  
B.A., Ohio State, 1933; M.A., Columbia, 1934.

\*EARL LAWRENCE KNIGHT (1941).....*Assistant Professor of Economics*  
B.S., Temple, 1928; M.A., Ohio State, 1932; Ph.D., 1940.

\*VORIS V. LATSHAW (1931, 1938)....*Assistant Professor of Mathematics*  
B.A., Indiana, 1927; A.M., 1928; Ph.D., 1930.

\*ROBERT MARVIN MAINS (1941, 1942).....*Assistant Director of Fritz Laboratory*  
B.S., University of Colorado, 1938; M.S., University of Illinois, 1940.

\*ROBERT WALLACE MAYER (1933, 1938).....*Assistant Professor of Economics*  
B.S., Illinois, 1930; M.S., 1931; Ph.D., 1933.

\*WILLIAM ANDREW McDONALD (1939, 1942).....*Assistant Professor of Latin*  
B.A., Toronto, 1935; M.A., 1936; Ph.D., Johns Hopkins, 1940.

\*ROBERT FRANCIS McNERNEY, JR. (1939, 1941)....*Assistant Professor of Romance Languages*  
Ph.B., Yale, 1929; Ph.D., 1937.

HERBERT GRUNFIELD MEANS (1943) .....*Assistant Professor of Mathematics*  
Ph.B., Grove City College, 1913; A.M., University of Pittsburgh, 1926;  
D.Ed., Beaver Falls, 1940.

\*DOUGLAS EWART MODE (1940, 1942)....*Assistant Professor of Electrical Engineering*  
B.S. in E.E., Pennsylvania, 1935; M.S., 1940.

\*BASIL WALDO PARKER (1940).....*Assistant Professor of Biology*  
S.B., Massachusetts Institute of Technology, 1933; Ph.D., 1939; A.M., Harvard, 1935.

\*ARTHUR EVERETT PITCHER (1938, 1939).....*Assistant Professor of Mathematics*  
A.B., Western Reserve, 1932; A.M., Harvard, 1933; Ph.D., 1935.

ALBERT AUGUSTUS RIGHTS (1933, 1943)....*Assistant Professor of English*  
A.B., Maine, 1927; A.M., Harvard, 1931.

\*FREDERIC ALLEN SCOTT (1935, 1939) .....*Assistant Professor of Physics*  
B.S., New York State College for Teachers, 1924; M.S., Lehigh, 1929;  
Ph.D., Rice Institute, 1935.

\*MALCOLM FINLAY SMILEY (1938, 1941).....*Assistant Professor of Mathematics*  
S.B., Chicago, 1934; Ph.D., 1937.

JUDSON GRAY SMULL (1919, 1938).....*Assistant Professor of Chemistry*  
B.S., in Chem., Lehigh, 1906; M.S., 1921.

\*BENJAMIN LICHTY SNAVELY(1931, 1938).....*Assistant Professor of Physics*  
B.S. in Eng. Phys., Lehigh, 1928; Ph.D., Princeton, 1935.

\*Absent on leave

## FACULTY

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\*CHARLES EMMET STOOPS, JR. (1942).....*Assistant Professor of Chemical Engineering*  
B.Ch.E., Ohio State University, 1937; Ph.D., Purdue University, 1942.

CARL FERDINAND STRAUCH (1938, 1941).....*Assistant Professor of English*  
A.B., Muhlenberg College, 1930; M.A., Lehigh, 1934.

JOHN SCHRADER TREMPER (1939).....*Assistant Professor of German*  
A.B., Colgate, 1928; M.A., Cornell, 1932; Ph.D., 1938.

EUGENE HENRY UHLER (1919, 1921).....*Assistant Professor of Civil Engineering*  
C.E., Lafayette, 1908.

RAY THEODORE WENDLAND (1944).....*Assistant Professor of Organic Chemistry*  
B.A., Carleton, 1933; Ph.D., Iowa State, 1937.

RALPH NEWCOMB VANARNAM (1928, 1942).....*Assistant Professor of Mathematics and Astronomy*  
E.E., Cornell, 1926; M.S., 1927.

ALBERT CHARLES ZETTLEMOYER (1941, 1943).....*Assistant Professor of Chemistry*  
B.S., Lehigh, 1936; M.S., 1938; Ph.D., M. I. T., 1940.

## LECTURERS

CHARLES AUSTIN BUCK (1933).....*Lecturer on Procurement of Raw Materials*  
B.S. in Chem., Lehigh, 1887; Eng.D. (Hon.), 1930.

NICHOLAS HUNTER HECK (1937).....*Lecturer on Geophysics*  
B.A., Lehigh, 1903; C.E., 1904; Sc.D. (Hon.), 1930.

HARRY FREDERICK HOFFMAN (1926).....*Lecturer in Psychiatry and Mental Hygiene*  
M.D., Hahnemann Medical College, 1910.

ROBERT EDWARD LARAMY (1940, 1942).....*Lecturer on Education*  
B.A., Lehigh, 1896; M.A., 1899.

ROY A. LEWIS (1924).....*Lecturer on Plant Management*

## INSTRUCTORS

\*LEE TERRELL ASKREN (1941).....*Instructor in Mechanical Engineering*  
B.S. in M.E., Purdue, 1939.

\*ROBERT AUGUST BUERSCHAPER (1929, 1941).....*Instructor in Physics*  
B.S. in Eng. Phys., Lehigh, 1937; M.S., 1940.

\*IRWIN RUSSEL BURKEY (1942).....*Instructor in Mechanical Engineering*  
B.S., Lehigh University, 1942.

ELBERT FRANCIS CARAWAY (1941).....*Instructor in Physical Education*  
B.S., Purdue, 1930.

\*RICHARD MALONE DAVIS (1941).....*Instructor in Economics*  
A.B., Colgate, 1939; M.A., Cornell, 1941.

\*WARREN EDWIN DEIFER (1944)....*Instructor in Mechanical Engineering*  
B.S. in I.E., Lehigh, 1941.

\*GEORGE EKAITIS (1942).....*Instructor in Physical Education*  
A.B., Western Maryland College, 1931.

\*Absent on leave

LEHIGH UNIVERSITY

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BELA KALMAN ERDOSS (1944).....*Instructor in Mechanical Engineering*  
M.E., Royal Joseph University of Technical Science, 1927; Ph.D., Lehigh  
University, 1944.

\*GEORGE DORMER FARNÉ (1934).....*Instructor in Romance Languages*  
A.B., Columbia College, 1926; M.A., Columbia, 1927.

\*WALTON FORSTALL, JR. (1940)....*Instructor in Mechanical Engineering*  
B.S. in M.E., Lehigh, 1931; M.S., 1943.

\*JAMES ALLEN GORDON (1941).....*Instructor in Physical Education*  
B.S., Miami University, 1931; M.A., Ohio State, 1936.

\*JOHN HAMMES GROSS (1944).....*Instructor in Mechanical Engineering*  
B.S. in Met. E., Lehigh, 1944.

WILLIAM GEORGE HAYWARD (1944).....*Instructor in Education*  
B.S., Rutgers University, 1930; A.M., Teachers College, Columbia University, 1932; Ed. D., 1940.

\*PAUL HESSEMER (1942).....*Instructor in Civil Engineering*  
Dipl. Ing., State Institute of Technology, Darmstadt, Germany, 1914.

\*EVERETT LEE JONES (1940, 1941).....*Instructor in English*  
A.B., Antioch College, 1938; M.A., Lehigh, 1941.

GALEN JONES (1944).....*Instructor in Education*  
B.S., McPherson College, 1918; M.A., Teachers, Columbia, 1921; Ph.D.,  
Teachers College, Columbia, 1935.

\*ERVAND KOGBETLIANTZ (1942).....*Instructor in Mathematics*  
A.B., University of Moscow; Ph.D., University of Paris.

\*HENRY AUGUST KREIBEL (1939).....*Instructor in Accounting*  
B.S. in Bus. Adm., Lehigh, 1932; M.A., 1937.

\*FRANCIS S. MCGUINESS (1943).....*Instructor in Mechanical Engineering*  
B.S. in M.E., Lehigh University, 1943.

LEONARD MICHAEL MILLER (1944).....*Instructor in Education*  
A.B., Albright College, 1920; M.A., New York University, 1934.

\*MELVIN PAUL MOORHOUSE (1942)....*University News Editor, Instructor*  
A.B., Westminster College, 1935. ....*in Journalism*

\*WILLIAM HAROLD ST. CLAIR (1944).....*Instructor in Mechanical*  
B.S. in M.E., Lehigh, 1944. ....*Engineering*

\*DAVID GALLUP SCOTT (1927).....*Instructor in Romance Languages*  
B.A., Princeton, 1925; M.A., Yale, 1926.

\*JAMES PLATTENBERGER SELL (1934, 1937).....*Instructor in Biology*  
B.A., Oberlin, 1931; M.S., Lehigh, 1937.

WILLIAM SHERIDAN (1911).....*Instructor in Physical Education*

\*PAUL EDWARD SHORT (1938)....*Assistant Director of Athletics, Instructor*  
B.S. in Bus. Adm., Lehigh, 1934. ....*in Physical Education*

ROBERT DANIEL STOUT (1939)....*Instructor in Metallurgical Engineering*  
B.S., Pennsylvania State College, 1935; M.S., Lehigh University, 1941.

\*LOUIS REED TRIPP (1939).....*Instructor in Economics*  
A.B., Union College, 1934; Ph.D.

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\*Absent on leave

FACULTY

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\*ANDRE WEIL (1942).....*Instructor in Mathematics*  
Sc.D., University of Paris, 1928.

ASSISTANTS

JOSEPH FURBER (1944).....*Assistant in Military Science and Tactics*  
Staff Sergeant, U.S.A.

GEORGE FRANCIS GASDA (1928).....*Assistant in Military Science and Tactics*  
Master Sergeant, D.E.M.L., U.S.A.

FREDERIC MERCUR (1935).....*Assistant in Physical Education*

LEO FRANCIS PRENDERGAST (1941).....*Assistant in Physical Education*  
B.S., Moravian College, 1936.

GLENN CREASY WANICH (1944).....*Assistant in Chemistry*  
B.S. in Ch.E., Lehigh University, 1943.

WALTER EMIL WOCKENEUSS (1941).....*Assistant in Military Science and Tactics*  
Sergeant, U.S.A.

FELLOWS

ROBERT DAVID BOARD (1944).....*Research Assistant in Mechanical Engineering*  
B.S. in I.E., Lehigh University, 1941.

WILLIAM FRANK CARLING (1944).....*Raybestos-Manhattan Research Fellow*  
B.S., Muhlenberg College, 1942.

JAMES A. FARR (1944).....*Koppers Company Research Fellow*  
B.S., Albright College, 1944.

VICTOR WARREN FOX (1945).....*National Lead Company Research Fellow*  
B.S. in Ch.E., Lehigh University, 1945.

HARRY NICHOLAS HANTZES (1944).....*Bichromate Sellers Program Research Fellow*  
B.S., Albright College, 1944.

THOMAS GARDE HARRIS (1937).....*Institute of Research Fellow in Chemistry*  
B.S. in Ch.E., Lehigh, 1937; M.S., 1939; Ph.D., 1941.

GEORGE WILLIAM HOUSTON (1945).....*National Lead Company Research Fellow*  
B.S. in Ch.E., Lehigh University, 1944.

WILLIAM DEXTER JOHNSON (1944).....*Armstrong Cork Company Fellow*  
B.A., University of Minnesota, 1939.

CARL THEODORE KLEPPINGER (1944).....*National Oil Products Company Research Fellow*  
B.S. in Chem., Lehigh University, 1944.

PEDRO VALMIR MONTENEGRO (1944).....*National Oil Products Company Fellow*  
B.S. in Chem., University of Alabama, 1944.

GEORGE DOUGLAS NELSON (1942).....*Research Assistant in Chemistry*  
B.S., Randolph-Macon, 1941.

CLIFTON REMS NEUMoyer (1942).....*Wm. S. Merrell Co., Research Assistant*  
B.S., Lehigh University, 1938.

ANNE MARIE PETERS (1943).....*Katherine Comstock Thorne Fellow in Biology*  
A.B., College of New Rochelle, 1943.

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\* Absent on leave.

LEHIGH UNIVERSITY

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ROBERT ROLAND RESSLER (1943).....*Raybestos-Manhattan Company*  
B.S., in Chem., Lehigh University, 1943. *Research Fellow*

CHARLES WINFRED TUCKER (1941).....*Research Assistant in Chemistry*  
B.S. in Ch.E., Cooper Union, 1941.

WILLIAM COMSTOCK WALKER (1943).....*Westvaco Chlorine Products*  
B.S. in Ch.E., Lehigh University, 1943. *Corporation Research Fellow*

SUMMER SESSIONS

(In addition to members of the regular staff)

GEORGE CHAMPLIN.....*Assistant Principal, New Rochelle,*  
*N. Y. High School*  
B.S., Rhode Island State, 1930; M.A., Teachers College, Columbia U.;  
Ed.D., Teachers College, Columbia U.

**STANDING COMMITTEES OF THE FACULTY**

(*The term of each member expires in June of the year given in parentheses after his name. The President is ex officio a member of all committees*)

**ADMISSIONS:** Director of Admissions Smiley (*ex officio*), Dean Congdon (*ex officio*), Registrar Curtis (*ex officio*), Professors F. C. Becker (1945), Anderson (1946), Brennecke (vice H. P. Thomas, on leave) (1947), Diamond (vice Crum, on leave) (1948), Allen (1949), Riley (1950), Shook (1951).

**ADVANCED STANDING:** Registrar Curtis (*ex officio*), Director of Admissions Smiley (*ex officio*), Professors Bradford (1944), Anderson (1946), Raynor (vice Ewing, on leave) (1947), Harmon (1948).

**DISCIPLINE:** Dean Congdon (*ex officio*), Professors Riley (vice Crum, on leave) (1945), Butts (vice Beale, on leave) (1946), Barthold (1947) and one student member: Willard S. Boothby, Jr.

**EDUCATIONAL POLICY:** Dean Congdon (*ex officio*), Professors Schulz (1945), More (1946), Willard (1947), Cowin (1948), Sutherland (1949).

**FACULTY EDUCATIONAL CLUB:** Professors Hazlehurst (1945), Stuart (1945), Schulz (1946), Reynolds (1946), Riley (1947), Graham (1947).

**HONORARY DEGREES:** Professors Beaver (1945), Neville (1946), Barthold (1947), Cowin (1948), Gipson (1949), Reynolds (1950).

**HOUSE COMMITTEE, DROWN MEMORIAL HALL:** Professor Beardslee and two student members: Victor W. Fox, Richard C. Huyette.

**INSPECTION TRIPS:** Professors Payrow (1945), Stewart (1946), Amstutz (1947), Miller (1948), Gruber (1949).

**PETITIONS:** Registrar Curtis (*ex officio*), Professors Diamond and Reynolds (1945), Anderson and Christensen (1946), Bradford and Brennecke (1947).

**PUBLICATIONS, BOARD OF:** Dean Congdon (*ex officio*), Professors Rights (*ex officio*), Clifford and three student members: Don L. Shettel, Paul B. Scarff, and John J. Shipherd.

**ROSTER:** Registrar Curtis (*ex officio*), Professors Gruber (1945), Lamson (1947), Hazlehurst (1948), Graham (1949).

**STANDING OF STUDENTS:** Deans Congdon, Palmer, Carothers, Callen, Professors Beaver, Bidwell, Doan, Larkin, Neville, Sutherland, Registrar Curtis, Director of Admissions Smiley, Director of G. C. D. More (*all members ex officiis*).

**STUDENT ACTIVITIES:** Dean Congdon (*ex officio*), Professors Whitcomb (1945), Bartlett (1946) and three student members: William J. Day, Willard S. Boothby, Jr., and William G. Wehner.

**STUDENT CLUB FINANCES:** Dean Congdon (*ex officio*), Professors Allen (1945), Trembley (1946), and three student members: William G. Wehner, Victor W. Fox, and Edward Luckenbach.

**SUMMER SESSION:** Director of Admissions Smiley (*ex officio*), Professors Whitcomb (1945), Eney (1946), Severs (1947), Stewart (1948), S. J. Thomas (1949).

## ADMINISTRATION

### Office of the Administrative Committee

PHILIP MASON PALMER, A.B., D.h.c., Litt.D., *Chairman*

NEIL CAROTHERS, B.A., Ph.D.

ALFRED COPELAND CALLEN, E.M., M.S.

HELEN GENEVIEVE RYAN, *Secretary to the Committee*

### Office of the Treasurer

\*JOHN IRVINE KIRKPATRICK, B.S. in Bus. Adm., *Treasurer*

ROBERT SAYRE TAYLOR, B.S., LL.B., *Acting Treasurer*

FREDERICK RALPH ASHBAUGH, *Bursar and Purchasing Agent*

MELVIN SCHISSLER, C.P.A., *Auditor*

\*JOHN WALTER MAXWELL, JR., B.S. in Bus. Ad., *Manager of the Supply Bureau*

STANLEY FREDERICK HEFFNER, *Acting Manager of the Supply Bureau*

EDWARD A. HOWER, *Manager of Realty, Brodhead Estate*

EDNA VIRGINIA DEAN, *Secretary to the Treasurer*

### Office of the Dean of Undergraduates

WRAY HOLLOWELL CONGDON, A.B., M.A., Ph.D., *Dean of Undergraduates*

### Office of the Registrar

GEORGE BARTLETT CURTIS, A.B., A.M., *Registrar and University Editor*

LEANOR RUTH GILBERT, *Recorder*

VIRGINIA RAIDLINE, *Assistant Recorder*

### Office of the Director of Admissions

EARL KENNETH SMILEY, A.B., M.A., *Director*

PAUL JUSTUS FRANTZ, JR., *Assistant to the Director*

### Deans of Divisions

PHILIP MASON PALMER, A.B., D.h.c., Litt.D., *Dean of the College of Arts and Science and of the General College Division*

NEIL CAROTHERS, B.A. DIP. IN ECON., PH.D., *Dean of the College of Business Administration*

ALFRED COPELAND CALLEN, E.M., M.S., *Dean of the College of Engineering*

TOMLINSON FORT, A.B., A.M., Ph.D., *Dean of the Graduate School*

### Directors of Curricula

PHILIP MASON PALMER, A.B., D.h.c., Litt.D., *Arts and Science*

NEIL CAROTHERS, B.A., DIP. IN ECON., PH.D., *Business Administration*

HARVEY ALEXANDER NEVILLE, A.B., M.A., Ph.D., *Chemistry and Chemical Engineering*

HALE SUTHERLAND, A.B., S.B., *Civil Engineering*

JACOB LYNFORD BEAVER, E.E., M.S., Sc.D., *Electrical Engineering*

CHARLES CLARENCE BIDWELL, A.B., Ph.D., *Engineering Physics*

FRED VIALL LARKIN, B.S., M.E., *Mechanical Engineering and Industrial Engineering*

GILBERT EVERETT DOAN, Ch.E., Ph.D., *Metallurgical Engineering*

ALFRED COPELAND CALLEN, E.M., M.S., *Mining Engineering*

\*Absent on leave

OFFICERS OF ADMINISTRATION

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**Summer Session**

E. KENNETH SMILEY, M.A., *Director*

**Faculty**

GEORGE BARTLETT CURTIS, A.B., A.M., *Secretary*

**Legal Counsel**

ROBERT SAYRE TAYLOR, B.S., LL.B., *Legal Counsel*

**Linderman Memorial Library**

HOWARD SEAVOY LEACH, A.B., M.A., *Librarian*

MARY ELIZA WHEATLEY, A.B., A.M., *Head Cataloguer*

RUTH HALL URBAN, B.A., B.S. in L.S., *Assistant Cataloguer*

MARY ELIZABETH VOOS, B.S., *Assistant Cataloguer*

LILLIE HESS, B.S. in Educ., B.S. in Lib. Sci., *Head of Circulation Department*

ELIZABETH REGINA HARTMAN, B.A., B.S. in Lib. Sci., *Assistant Circulation Librarian*

**Packer Memorial Church**

THE REV. CLAUDE GILLETTE BEARDSLEE, B.A., B.D., M.A., S.T.M.,  
Ph.D., *Chaplain*

THOMAS EDGAR SHIELDS, Mus.D., A.A.G.O., *Organist*

**The Fritz Engineering Laboratory**

HALE SUTHERLAND, A.B., S.B., *Director*

**Students' Health Service**

CARL OTTO KECK, M.D., *Director*

ELIZABETH BEHR AGOCS, R.N., *Nurse in charge of Dispensary*

**Lamberton Dining Service**

BERTHA BOWMAN, B.A., *Manager of Dining Service*

**Division of Intercollegiate Athletics**

ELBERT FRANCIS CARAWAY, B.S. in Ed., *Acting Director of Athletics and Business Manager*

**University Band**

THOMAS EDGAR SHIELDS, Mus.D., A.A.G.O., *Director*

**Placement Bureau**

ELIAS ROBINS MORGAN, M.E., *Director*

**Department of Buildings and Grounds**

ANDREW WILLARD LITZENBERGER, *Superintendent of Buildings and Grounds*

JOHN DAVID HARTIGAN, *Superintendent of Power Plant*

STANLEY HARRISON PETERS, *General Foreman*

**Alumni Association**

ROBERT FORD HERRICK, B.A., *Executive Secretary*

LEONARD HUBERT SCHICK, A.B., *Assistant Secretary and Editor of the Lehigh Alumni Bulletin*

**Special Standing Committees**

**ADVISORY COUNCIL ON GENERAL EDUCATION:** Professors Diamond, Executive Chairman, Beardslee, Secretary, F. C. Becker, Doan, Neville, Palmer, Shook, Smith, Sutherland, Butts, Crum, Gipson, Hazlehurst, Trembley, Whitcomb, Howland, Clifford.

**ART EXHIBITIONS:** Professors Palmer, Howland, Librarian Leach.

**ATHLETIC ELIGIBILITY:** Messrs. Caraway (*ex officio*), Willard (1945), Whitcomb (1946), Barthold (1947).

**"BOSEY REITER CUP" COMMITTEE:** Dean Congdon, Dr. Beardslee, Director of Admissions Smiley.

**CHAPEL:** Professors Beardslee, Shields, Reynolds, Beaver.

**EXECUTIVE COMMITTEE OF THE GRADUATE FACULTY:** Dean Fort (*ex officio*), Professors Moore (*ex officio*), Doan (1945), Willard (1946), Smith (1947), Barthold (1948), Beaver (1949).

**INSTITUTE OF RESEARCH:** President Williams, Deans Fort, Carothers, Callen, Palmer, University Editor Curtis (*ex officiis*); Professors Sutherland, F. V. Larkin, Bidwell, Gipson, S. J. Thomas, Willard, Doan, Neville, Graham and Beaver.

**LECTURES:** Professors Harmon, Clifford (1945), Bratt (1945), Graham (1946), Registrar Curtis (1946).

**LIBRARY:** Librarian Leach (*ex officio*), Professors Severs (1945), Lamson (1946).

**MUSIC:** Professors Shields, Palmer, Beardslee, Registrar Curtis.

**PROFESSIONAL ENGINEERING DEGREES:** Professors F. V. Larkin, Sutherland, Callen, Doan.

**REGISTER:** Registrar Curtis, Director of Admissions Smiley, Professors Smith, Cowin.

**SCHOLARSHIPS AND LOANS:** Dean Congdon, Director of Admissions Smiley, Acting Treasurer Taylor.

**STUDENT CONCERTS—LECTURES SERIES, FACULTY ADVISORY COMMITTEE ON:** Registrar Curtis, Professors Shields, Shook.

**TEACHER PLACEMENT:** Dean Congdon, Dean Palmer, Mr. Morgan.

**WILLIAMS SENIOR PRIZES:** Professors Smith, Palmer, Carothers, Gipson, Graham.

## HISTORY

Lehigh University was chartered by the Legislature of Pennsylvania by an act dated February 9, 1866. In 1865 the Hon. Asa Packer, of Mauch Chunk, inaugurated a movement to provide an institution that would afford training and education in the learned professions as then recognized, and in technical branches, the importance of which was then just becoming apparent in the development of the industrial and transportation interests of the country. He made an initial donation of a large tract of land for this purpose and the sum of \$500,000.00 to which he added largely during his lifetime and by his will.

Since its foundation the equipment and resources of the University have steadily increased through the continued interest of the university's trustees, alumni, and friends. The University now occupies twenty-three buildings and its grounds cover one hundred and ninety acres on the north side of South Mountain, overlooking the valley of the Lehigh River and the city of Bethlehem.

The present endowment totals \$8,000,000.00.

## REQUIREMENTS FOR ADMISSION

The enrollment of Lehigh University is strictly limited by action of its board of trustees, with a resulting limitation in the number of candidates who can be admitted each year in the several divisions of the University. Women are not admitted as undergraduates or as special students except in the summer semester.

In the selective procedure necessitated by this limitation, the University, through its office of admissions, takes into account a number of criteria, which are believed to have some individual validity, and in combination a high degree of validity, in predicting probable success in college work. The object is to select those candidates who are most likely to profit fully by the programs offered at this University.

The criteria considered include:

- I. Certain quantitative subject-matter requirements.
- II. The quality of the individual student's work in the secondary school.

III. Such qualifications as sound health, emotional stability, intellectual motivation, and established habits of industry and regularity.

IV. The candidate's showing in a scholastic aptitude test and other tests, in cases where such tests are prescribed by the University.

## I. QUANTITATIVE SUBJECT-MATTER REQUIREMENTS

All candidates must offer fifteen units of entrance credit, by certificate from an accredited school, or by examination, or by a combination of these methods.\* The fifteen units represent the quantitative equivalent of the usual four-year high school or preparatory school course.

### PRESCRIBED SUBJECTS

The fifteen units must include certain prescribed subjects, together with sufficient electives to make up the required total. The only subjects prescribed are those which are essential prerequisites for college courses which the student should take in his first year in the University.

For the several colleges within the University, the prescribed subjects and the number of electives are as follows:

For the College of Arts and Science—

	Units *
English .....	3
Foreign language (ordinarily Latin or German or French or Spanish) .....	2
Elementary and Intermediate Algebra .....	$1\frac{1}{2}$
Plane Geometry .....	1
Electives .....	$7\frac{1}{2}$
	<hr/>
	15

For the College of Business Administration—

	Units *
English .....	3
Elementary and Intermediate Algebra .....	$1\frac{1}{2}$
Plane Geometry .....	1
Electives .....	$9\frac{1}{2}$
	<hr/>
	15

\*A unit represents a year's study in a single subject in a secondary school, comprising the work of 180 recitation periods (5 periods a week for 36 weeks) of 40 minutes each or the equivalent.

## For the College of Engineering—

	Units *
English .....	3
Elementary and Intermediate Algebra .....	$1\frac{1}{2}$
Plane Geometry .....	1
Plane Trigonometry and Logarithms .....	$\frac{1}{2}$
Solid Geometry or Advanced Algebra.....	$\frac{7}{2}$
Electives .....	$8\frac{1}{2}$
	15

## ELECTIVES

The electives may be offered in any subject studied under standard conditions in an accredited high school or preparatory school. In general, electives in the fields of foreign language, mathematics, history, and science are preferred, but in the case of a superior student the requirements as to electives may be satisfied in whole or in part by courses in commercial subjects, manual arts, or fine arts.

It should be understood, however, that meeting in full the foregoing subject requirements does not insure admissions, but insures only eligibility for consideration in the light of remaining criteria.

## II. THE CRITERION OF QUALITY

The quality of the student's work will be judged primarily by his rank or relative average grade in his class. Consideration will be given also to the extent to which he has made grades distinctly higher than the passing grade; to evidence of improvement or deterioration in quality in the course of his progress through the secondary school; to his relative success or failure in the particular subjects which he proposes to continue in college; and to the comments and recommendations of his principal or headmaster.

## III. OTHER QUALIFICATIONS

Information with respect to the other qualifications considered, including sound health, emotional stability, intellectual motivation, and established habits of industry and regularity, is obtained

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\*A unit represents a year's study in a single subject in a secondary school, comprising the work of 180 recitation periods (5 periods a week for 36 weeks) of 40 minutes each or the equivalent.

from principals and headmasters, and may be supplemented through personal interviews. The University reserves the right to require any candidate for admission to present himself for an interview and to base the selection of candidates in part upon the appraisals obtained through such interviews.

#### IV. SCHOLASTIC APTITUDE TESTS AND OTHER TESTS

Examinations may be required of any candidate. Examinations will not be given as a substitute admission procedure when an applicant's record is in general unsatisfactory, but will be assigned to obtain supplementary evidence when there is reasonable doubt as to the applicant's readiness to do successful college work, and when additional information is desired for proper placement.

##### SCHOLASTIC APTITUDE TEST

Any candidate may be required to take a scholastic aptitude test. Ordinarily this test will be required of students ranking in the lower half of their graduating class in the high school or preparatory school. In cases where such a test is required the University may prescribe either the scholastic aptitude test given by the College Entrance Examination Board or a scholastic aptitude test to be taken at the University.

The College Entrance Examination Board will administer the following four series of tests during the academic year 1945-1946:

Saturday, June 2, 1945  
Wednesday, September 5, 1945  
Saturday, December 1, 1945  
Saturday, April 6, 1946  
Saturday, June 1, 1946  
Saturday, September 7, 1946

The following program of tests will be offered at each series:

9:00 A.M.—Scholastic Aptitude Test—including a verbal and mathematical section (three hours)

2:00 P.M.—Achievement Tests—Not more than three of the following one-hour tests:

English Composition	Spanish Reading
Social Studies	Biology
French Reading	Chemistry
German Reading	Physics
Latin Reading	Spatial Relations

2:00 P.M.—\*Comprehensive Mathematics Test (three hours)  
(Beginning in April, 1946, this test will be given at 9:00 A.M.)

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\* The schedule does not permit a candidate to take both this test and an achievement test.

A Bulletin of Information containing rules for the filing of applications and the payment of fees, lists of examination centers, etc., may be obtained without charge from the College Entrance Examination Board. The Board does not publish a detailed description of the Scholastic Aptitude Test, the Comprehensive Mathematics Test, or the Achievement Tests. Brief descriptions are included in the Bulletin. A practice form of the Scholastic Aptitude Test will be sent to every candidate who registers for this test.

Candidates should make application by mail to the College Entrance Examination Board, P. O. Box 592, Princeton, New Jersey. Blank forms for this purpose will be sent to any teacher or candidate upon request. When ordering the forms, candidates should state whether they wish to take the December, April, June, or September tests.

In order to facilitate the arrangements for the conduct of the tests, all applications should be filed as early as possible. Each application should be accompanied by the appropriate examination fee, which is four dollars for candidates who take only the Scholastic Aptitude Test and eight dollars for all other candidates.

When a candidate has failed to obtain the required blank form of application, the regular fee will be accepted if it arrives not later than the specified date and is accompanied by the candidate's name and address, the exact examination center selected, the college to which the report is to be sent, and the test or tests to be taken.

Applications and fees should reach the office of the Board not later than the dates specified in the following schedule:

	December 1945 Series	April 1946 Series	June 1946 Series	September 1946 Series
<i>For examination centers located:</i>				
In U.S. East of Mississippi River or on Mississippi River.....	Nov. 10	Mar. 16	May 11	Aug. 17
In U.S. West of Mississippi River or in Canada .....	Nov. 3	Mar. 9	May 4	Aug. 10
Outside U.S. and Canada except in China and elsewhere in Orient .....	Oct. 20	Feb. 23	Apr. 20	July 27
In China and elsewhere in Orient .....	Oct. 6	Feb. 9	Apr. 6	July 13

Belated applications will be subject to a penalty fee of three dollars in addition to the regular fee.

The Board will report the results of the tests to the institutions indicated on the candidates' applications. The colleges will, in turn, notify the candidates of the action taken upon their applications for admission. Candidates will not receive reports upon their tests from the Board.

#### APPLICATIONS FOR ADMISSION

Applications for admission to the University should be submitted to the director of admissions, Lehigh University, Bethlehem, Pennsylvania, as early as possible during the applicant's senior year in secondary school. Appropriate forms for filing applications for admission may be secured from the director of admissions.

#### ADMISSION OF VETERANS

A veteran of the armed services who does not present a total of 15 units of entrance credit may be admitted to Lehigh University on the basis of satisfactory educational proficiency and achievement as evidenced by reports of aptitude and achievement tests administered by the armed services; by reports of special educational or technical training completed while a member of the armed services; and by satisfactory scores on examinations of the College Entrance Examination Board as designated for each applicant by the Office of Admissions. Veterans are urged to establish eligibility for admission to the University without waiting for the date of separation from the armed forces. Veterans who wish to enter Lehigh University after their separation from the armed services should, accordingly, file with the Director of Admissions formal applications for admission to the University, and formal transcripts of previous academic experience both in high school and in any college or university previously attended.

#### SPECIAL SERVICE TESTS

The College Entrance Examination Board, as a general service, has prepared three forms of a three hour test designed for use primarily with returning service personnel. The tests, designated Form SV-1, SV-2, and SV-3, consist of three one hour sections as follows:

**Form SV-1**  
Verbal  
Mathematical  
Spatial

**Form SV-2**  
Verbal  
Mathematical  
Science (physical)

**Form SV-3**  
Verbal  
Mathematical  
Social Studies

The first two sections are identical in all three forms. The science section stresses what might be called common sense informational material such as was used successfully in the Army-Navy College Qualifying Tests. The mathematical test requires a knowledge of only elementary algebra and stresses manipulation and ingenuity rather than mastery of advanced subject matter. The social studies section requires the student to read, with comprehension, material from the field of the social sciences. The appropriate form will be made available at Lehigh University when required by the Admissions Office.

#### **ACCEPTANCE OF ADMISSION AND DEPOSIT**

Each candidate who is notified of admission is required to file with the office of admissions, within ten days after such notification, a formal acceptance of his admission, asserting his definite intention to enroll in Lehigh University on a specified date; and this formal acceptance must be accompanied by a deposit of \$25 (check or money order payable to Lehigh University).

This deposit will be applied toward the incidental and laboratory fees and deposits for the first semester; but the deposit is forfeited in case of non-enrollment for the specified semester.

#### **ACCREDITED SCHOOLS**

Lehigh University has no permanent arrangement with any school whereby certificates are accepted in place of entrance examinations; but certificates are ordinarily accepted from first-class high schools in Pennsylvania and from schools accredited by the Middle States Association of Colleges and Secondary Schools, the New England College Entrance Certificate Board, the Regents of the University of the State of New York, the North Central Association of Colleges and Secondary Schools, the Association of Colleges and Secondary Schools of the Southern States, and the state universities of those states having such institutions.

#### **ADMISSION TO ADVANCED STANDING**

Candidates for admission by transfer from other institutions may be admitted with advanced standing, subject to the enrollment limitations of the several divisions of the University, pro-

vided their college records up to the time of transfer are thoroughly satisfactory to the University. Such candidates must have met the entrance requirements prescribed for undergraduates of Lehigh University.

A student who desires to transfer to Lehigh University from another university, college, or junior college, must submit an official transcript of his record in the other institution; this transcript should include his college credits, a list of the entrance credits accepted for admission to the other institution, and a statement of honorable dismissal. A copy of the catalog of the college or university previously attended should be sent to the director of Admissions, Lehigh University.

A candidate who has attended more than one university, college, or junior college, must present a record from each institution; failure to submit a complete record of former academic experience will result in cancellation of registration.

Graduates of recognized colleges of liberal arts and sciences whose courses have included a year of physics, a year of chemistry, and mathematics through the calculus may ordinarily earn the degree of B.S. in engineering from Lehigh University on the successful completion of a two-year program which will be individually planned for each candidate.

A student who intends to enter an engineering curriculum at Lehigh University after graduation from college should so arrange his work in college as to cover as many as possible of the subjects of the freshman and sophomore years of the engineering curriculum he selects.

#### **Examinations for Advanced Standing**

Candidates who have completed advanced courses in approved secondary schools may, with the consent of the director of admissions and of the department concerned, receive permits to take anticipatory examinations without fee to establish advanced standing on the basis of work completed in secondary schools.

Candidates for admission who wish to take examinations for advanced credit in any subject should notify the director of admissions at least one month prior to the date of registration.

## TUITION

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### **ADMISSION OF SPECIAL STUDENTS**

Special students may be admitted on recommendation of the director of admissions and of the director of the curriculum in which the candidate wishes to enroll, subject to the approval of the committee of admissions. Candidates must be at least twenty-one years of age and must present evidence of ability to pursue with profit the subjects that they wish to study at the University.

### **LATEST DATE FOR REGISTRATION**

No registration of new students is accepted later than the tenth day of instruction in any semester.

### **VACCINATION REQUIREMENT**

Smallpox vaccination is required, under the laws of the Commonwealth of Pennsylvania, for all students entering the University. Certificates are accepted for this requirement when the vaccination has been performed within three years of the time of matriculation, has resulted in a true vaccinia (take), and the scar gives evidence of a recent vaccinia. Since the vaccinations at the University are performed and the reactions read by the method recommended by the United States Public Health Service, students are advised to wait until they arrive at the University to have this done.

## **UNDERGRADUATE TUITION AND OTHER FEES**

### **FIRST SEMESTER**

(Payable on registration day)

Tuition fee .....	\$200.00
Athletic fee .....	5.00
Health service fee .....	6.00
Student activities fee .....	2.50
Library fee .....	2.50
Student concerts-lectures fee .....	1.00

Total fees, first semester.....\$217.00

### **SECOND SEMESTER**

(Payable on registration day)

Tuition fee .....	\$200.00
Athletic fee .....	5.00
Health service fee .....	6.00
Student activities fee .....	2.50
Library fee .....	2.50
Student concerts-lectures fee .....	1.00

Total fees, second semester.....\$217.00

**MATRICULATION AND GRADUATION FEES.** New students pay, once only, on admission, a matriculation fee of \$5.00; students at graduation pay a graduation fee of \$10.00. A candidate who pays his graduation fee and then fails to qualify for his degree will, on application, receive a refund of the fee.

**LABORATORY FEES AND DEPOSITS.** There are also laboratory fees or deposits in laboratory courses to cover the cost of laboratory supplies used by the individual students and to provide for breakage of glassware and instruments. For convenient reference a schedule of the laboratory fees for various courses is given below. A deposit of \$25.00 is made by each student taking courses in military science and tactics; this deposit is refunded when the government property issued to the student is returned.

**LATE REGISTRATION FEES.** The penalty for late registration is \$1.00 a day up to a maximum of \$5.00, for each day of delay beyond the registration days in taking out the registration ticket; and a registration not completed within three days after the date on the registration ticket is subject to a late registration fee of \$1.00 a day up to a maximum of \$5.00.

#### **LABORATORY FEES AND DEPOSITS PER SEMESTER**

(Unless otherwise noted, the amounts listed indicate fees which are payable and not returnable.)

##### **Biology**

Biology .....	\$ 3.00
Mammalian Anatomy .....	5.00
Comparative Anatomy of Vertebrates .....	3.00
Botany .....	3.00
Zoology .....	3.00
Animal Ecology .....	3.00
Economic Botany .....	3.00
Sanitary Bacteriology .....	3.00
Bacteriology .....	3.00
Biology of Bacteria .....	3.00
Natural History and Ecology .....	2.00
Histology .....	3.00
Advanced Bacteriology .....	3.00
Industrial Bacteriology .....	3.00
Public Sanitation .....	3.00

##### **Chemistry**

Note: The following amounts are all deposits and unused balances are returnable.

Chemistry Laboratory .....	\$15.00
Elementary Chemistry and Qualitative Analysis .....	25.00
Quantitative Analysis .....	30.00
Assaying, Coal, Gas, and Oil Analysis .....	30.00
Chemical Engineering .....	25.00
Research Chemistry Laboratory .....	15.00
Advanced Analytical Chemistry .....	30.00
Radiation Methods Laboratory .....	10.00
Qualitative Organic Chemistry .....	10.00

TUITION

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Organic Chemistry Laboratory .....	30.00 or 40.00
Advanced Organic Laboratory .....	30.00
Industrial Biochemistry Laboratory.....	15.00
Chemical Engineering Practice .....	10.00
Physical Chemistry Laboratory .....	10.00
Electrochemistry Laboratory .....	5.00

**Civil Engineering**

Materials Testing Laboratory .....	\$ 5.00
Hydraulics Laboratory .....	5.00
Mechanics of Materials .....	2.50
Hydraulics .....	5.00
Concrete Laboratory .....	5.00

**Electrical Engineering**

Dynamo Laboratory, Elementary .....	\$ 6.00
Dynamo Laboratory, Intermediate .....	6.00
Dynamo Laboratory, Advanced .....	6.00 or 12.00
Dynamo Laboratory, Beginning .....	6.00
Dynamo Laboratory, Combined .....	6.00
Electrical Communication .....	6.00
Electric Transients .....	6.00

**English**

Contemporary Literature, book fee .....	\$ 2.50
Dramatics .....	3.00
Dramatics (summer session) .....	5.00
Brown and White .....	1.00
Newspaper Reporting and Writing .....	2.00
Advanced Newspaper Reporting and Writing .....	2.00
Newspaper Editing and Copy Reading .....	1.50
Press Photography .....	3.00

**Geology**

Mineralogy .....	\$ 5.00
Engineering Mineralogy .....	5.00
Principles of Geology .....	1.00
Field Geology .....	1.00
Petrography .....	3.00

**Mechanical and Industrial Engineering**

Engineering Laboratory .....	\$ 6.00
Advanced Work in Engineering Laboratory .....	6.00

**Metallurgical Engineering**

Deposit:	
Thesis in Metallurgy .....	\$10.00
Fees:	
Metallurgical Laboratory .....	\$ 5.00
Introduction to Metallurgy .....	5.00
Metallurgy of Iron and Steel .....	5.00
Physical Metallurgy .....	5.00
Metallography .....	5.00
Electrochemical Laboratory .....	5.00

**Mining Engineering**

Deposits:	
Fuel Technology Laboratory .....	\$10.00
Flotation .....	10.00
Fee:	
Ore Dressing, Coal Preparation and Laboratory .....	\$ 5.00

**Physics**

Introduction to Physics .....	\$ 6.00
General Physics Laboratory .....	10.00
Mechanics, Properties of Matter and Light .....	6.00
Dynamics and Heat .....	6.00
Electricity and Magnetism .....	6.00
Electrical Laboratory .....	6.00
Electric Oscillations and Electric Waves .....	6.00
Physical Optics and Spectroscopy .....	6.00
Electrical Discharge through Gases .....	6.00
Pyrometry .....	6.00
Geophysics .....	6.00
Advanced Laboratory .....	6.00

**EXAMINATION FEES.** Students who for satisfactory reasons were absent from final examinations will, upon petition, be allowed to take make-up examinations without payment of any examination fee. A fee of \$5.00 is charged for any examination subsequent to the first regular final or make-up examination allowed upon petition in any course. This regulation applies to the psychological and placement examinations required of new students if taken at other than the scheduled date.

**LATE PHYSICAL EXAMINATION FEE.** Any student who fails to keep his appointment for his physical examination is charged a late examination fee at the rate of \$1.00 a day up to a maximum of \$5.00 until he applies for and meets another appointment; if he fails to meet the second appointment or any subsequent appointment, he again becomes subject to a similar fee.

**REFUNDS.** In the event that a student withdraws from the University after the payment of fees, he may elect either to receive a refund according to the schedule indicated below, or to receive credit in full in proportion to the remaining fraction of the semester if and when he returns to the University.

To the student who formally withdraws within the first week (*i. e.*, the first six days of instruction) of the semester, a refund in full will be made of tuition fee, athletic fee, student activities fee, and unused balance of laboratory fees.

To a student who formally withdraws after the first week, half of these fees will be retained, and a fraction of the other half will be refunded proportional to the remainder of the semester.

To a student who formally withdraws at any time and does not receive a refund, full credit for these fees in proportion to the fraction of the semester remaining after the withdrawal will be allowed if and when that student re-enrolls in the University.

In the event of death of a student, the above fees will be refunded in full in proportion to the fraction of the semester remaining at the time of his death.

No refund or credit is allowed on the health service fee, nor on the library fee. The matriculation fee is never refunded.

## TUITION

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**EXEMPTIONS.** Students registered for fewer than seven semester hours are exempted from the library and health service fees. The payment of the athletic fee and the student activities fee is optional for graduate students and also for undergraduates who are registered for fewer than seven semester hours.

**SPECIAL SCHEDULES.** Tuition for special schedules of less than twelve hours in any semester is at the rate of \$12.50 a semester hour. Tuition for extra hours in excess of one hour above the normal schedule for a student's curriculum and class is at the rate of \$12.50 per semester hour for each excess hour.

**STUDENT ACTIVITIES FEE.** The student activities fee is appropriated as follows: *Lehigh Brown and White*, \$1.75; Arcadia, \$1.15; Class dues, \$0.70; Mustard and Cheese Club, \$0.50; Combined Musical Clubs, \$0.30; Band, \$0.40; debating, \$0.20. For this fee each student receives a year's subscription to the semi-weekly undergraduate newspaper, tickets to each dramatic performance given by the Mustard and Cheese Club, and tickets to the concerts of the Combined Musical Clubs. In addition, this fee covers all class and student government (Arcadia) dues. The appropriation for the band and for debating represents student support of those activities.

## EXPENSES

Minimum expenses for the two semesters of a college year, clothing and travel not included, are estimated at \$600.00 in addition to tuition.

Expenses of undergraduates vary somewhat according to the habits and tastes of the individual students. There are certain basic expenses, however, which must be met by all students; these expenses are listed below. A schedule of necessary expenses for the two semesters of the freshman year might be constructed as follows:

<b>First Semester:</b>		<b>Minimum</b>	<b>Average</b>
Matriculation fee .....	\$ 5.00	\$ 5.00	
Health service fee .....	6.00	6.00	
Athletic fee .....	5.00	5.00	
Activities fee .....	2.50	2.50	
Library fee .....	2.50	2.50	
Student concerts-lectures fee .....	1.00	1.00	
Tuition .....	200.00	200.00	
*Military uniform deposit .....	25.00	25.00	
†Physics laboratory fee .....	6.00	6.00	

LEHIGH UNIVERSITY

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<b>#Chemistry deposit .....</b>	<b>15.00</b>	<b>15.00</b>
Books .....	30.00	35.00
Supplies .....	15.00	20.00
Dormitory room .....	70.00	90.00
Board .....	120.00	150.00
	<hr/>	<hr/>
	\$503.00	\$563.00
<b>Second Semester:</b>		
Health service fee .....	\$ 6.00	\$ 6.00
Athletic fee .....	5.00	5.00
Activities fee .....	2.50	2.50
Library fee .....	2.50	2.50
Student concerts-lectures fee .....	1.00	1.00
Tuition .....	200.00	200.00
<b>#Chemistry deposit .....</b>	<b>25.00</b>	<b>25.00</b>
Books and supplies .....	10.00	15.00
Dormitory room .....	70.00	90.00
Board .....	120.00	150.00
	<hr/>	<hr/>
	\$442.00	\$497.00
<b>Total, freshman year .....</b>	<b>\$945.00</b>	<b>\$1060.00</b>

\* Returned at the end of the year.

† This may become due the second semester instead of the first.

‡ Unused portion is returned at the end of the semester.

Since three semesters are now included in each calendar year under the accelerated program, the total cost for the calendar year will amount to approximately 50% more than the cost of the two semesters of the freshman year.

The schedule above does not include drawing instruments nor slide rule. These vary in price, but adequate drawing sets may be had at \$15.00, and slide rules at varying costs, \$12.00 representing a fair allowance for a rule which will serve throughout the college course and in professional work.

Books, stationery, and drawing instruments may be purchased at the supply bureau in the Alumni Memorial Building.

Items of personal expense, clothes, travel, and the like cannot be estimated except for each student individually, according to his personal habits and circumstances. If a prospective student plans to accept an invitation to join a fraternity, he should anticipate an additional annual cost of approximately \$90.00 plus the amount of initiation fee. The initiation fee varies considerably among the fraternities, but can always be ascertained before joining.

### DORMITORIES

There are dormitory accommodations in the Henry Reese Price House, the Charles Lewis Taylor House, the Charles Russ Richards House, and the Henry Sturgis Drinker House for 453 students. Rental is from \$25 to \$100 a semester for each occupant.

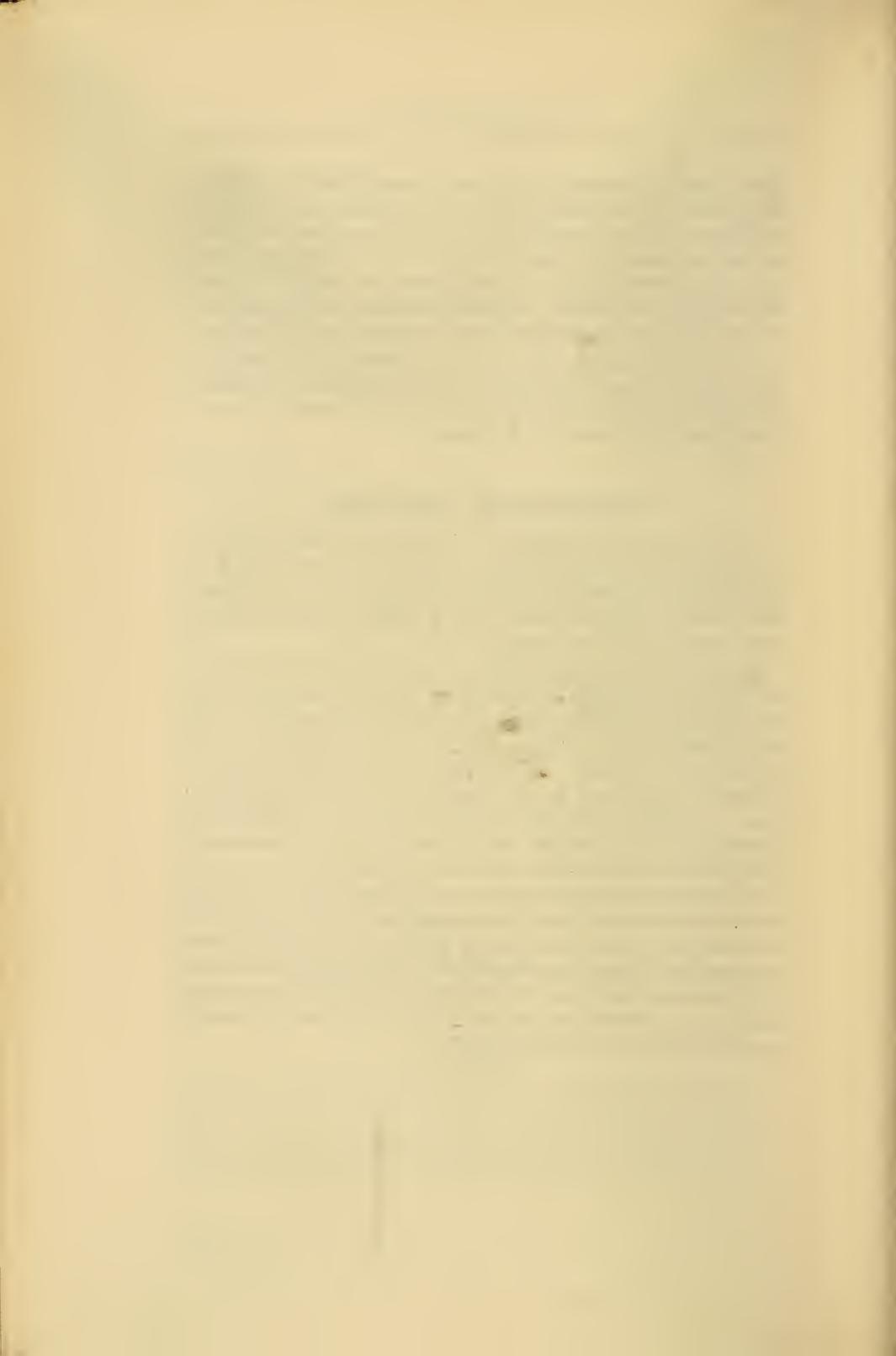
Only a limited number of the lower rental rooms is available. The policy of the University is to make these accommodations available to students in all classes. Returning students are given the first opportunity to select dormitory rooms. Immediately following this selection, the remaining rooms are available to new students. Full information regarding dormitory accommodations will be sent upon request addressed to the director of admissions.

A campus restaurant is located in Lamberton Hall. Numerous private householders in the city offer rooms and board at moderate prices; information concerning such rooms and board may be obtained from the director of admissions.

## ACCELERATED PROGRAM

As a part of the war program, in order that students may complete the work for a baccalaureate degree in a shorter period of time than the conventional four years, the University has adopted an accelerated program on the basis of which students complete their work in thirty-two months.

Each semester is sixteen weeks in length, as were the semesters on the conventional basis. Acceleration has been accomplished by eliminating all vacations except one week at Christmas time and the interval of one week between each of the semesters. In this manner three semesters are provided each year. First semester courses will be taught in the summer semester extending from June to October, 1945; the second semester will extend from October, 1945, to February, 1946; the following first semester for upperclassmen will extend from February to June, 1946, with the second semester courses being taught in the semester from June to October, 1946. Adjustments have been made so that Freshmen may enter in February, June, or October and proceed to their degree more rapidly than would be the case if admission were postponed. A full program of work for entering Freshmen is offered each semester, with corresponding second semester courses the following semester.



**The College of  
Arts and Science**



# THE COLLEGE OF ARTS AND SCIENCE

## Administrative Officers

Philip Mason Palmer, *Dean of the College of Arts and Science*

Wray Hollowell Congdon, *Dean of Undergraduates*

George Bartlett Curtis, *Registrar*

Earl Kenneth Smiley, *Director of Admissions*

## Faculty

Allen Jennings Barthold.....	Romance Languages
Claude Gillette Beardslee.....	Moral and Religious Philosophy
Frank Chester Becker.....	Philosophy
Glenn James Christensen.....	English
James Lowry Clifford.....	English
Wray Hollowell Congdon.....	Education
Tomlinson Fort .....	Mathematics
Augustus Henry Fretz.....	Geology
Lawrence Henry Gipson.....	History
James Larmour Graham.....	Psychology
George Dewey Harmon.....	History
William George Hayward.....	Education
Nicholas Hunter Heck.....	Geophysics
Garth Ahyman Howland.....	Fine Arts
Galen Jones .....	Education
Kenneth Worcester Lamson.....	Mathematics
Robert Edward Laramy.....	Education
Leonard Michael Miller.....	Education
Robert Pattison More.....	German
Philip Mason Palmer.....	German
George Emil Raynor.....	Mathematics
Joseph Benson Reynolds.....	Mathematics
Albert Augustus Rights.....	English and Speech
Edgar Heisler Riley.....	English
Ernst Bernhard Schulz.....	Government
Jonathan Burke Severs.....	English

Thomas Edgar Shields.....	<i>Music</i>
Clarence Albert Shook.....	<i>Mathematics</i>
Robert Metcalf Smith.....	<i>English</i>
Carl Ferdinand Strauch.....	<i>English</i>
Stanley Judson Thomas.....	<i>Biology</i>
Francis John Trembley.....	<i>Biology</i>
John Schrader Tremper.....	<i>German</i>
Ralph Newcomb Van Arnam.....	<i>Mathematics and Astronomy</i>
Lawrence Whitcomb.....	<i>Geology</i>
Bradford Willard.....	<i>Geology</i>

## THE COLLEGE OF ARTS AND SCIENCE

The College of Arts and Science of Lehigh University comprises the departments of biology, education, English, fine arts, geology, German, Greek, history and government, Latin, mathematics and astronomy, music, moral and religious philosophy, philosophy, psychology, and romance languages. Courses in economics, sociology, accounting, and finance are provided by the College of Business Administration; physics and chemistry are supplied by the College of Engineering.

The degree of Bachelor of Arts is conferred upon graduates of the College of Arts and Science.

### Requirements for Graduation

1. The completion of one hundred twenty credit hours of collegiate work, apportioned so as to cover the distribution and concentration requirements, in addition to military science and tactics, moral and religious philosophy, and physical education, required of all students.
2. The passing of a comprehensive examination in the major field.

### The Course of Study

Each student in the College of Arts and Science is considered from the beginning of his course as an individual. The College expects every student to have a well-defined purpose at entrance,

but recognizes the student's right to change his objective and for that reason gives him two years in which to find himself and establish the direction of his future career. To help the student in his decision, the College provides an advisory staff consisting of the dean of the College, who is adviser of freshmen, and the heads of departments in which major sequences are given. The individual program for each student is outlined tentatively in an interview with the dean of the College during freshman week. This preliminary program is determined by the nature and quality of the student's preparation and by the student's personal interests. The final program, which is made out in detail at the end of the sophomore year, takes into account, in addition, demonstrated aptitudes and pre-professional or vocational needs.

These individual programs admit of considerable elective choice. The number of elective courses depends upon the demands of the distribution and concentration requirements which occupy from sixty to eighty per cent of the student's time. The number of purely elective hours ranges from twenty-one to forty-five out of the hundred and twenty required for graduation. In general, the student in the College of Arts and Science may elect any undergraduate course given at the University for which he has the prerequisites. This privilege combined with the wide choice offered by the major sequences, *i. e.*, the concentration requirements, enables the College to provide specialization in a large number of fields and preparation for individual careers.

#### **Preparation for Professional Schools and the Professions**

The College of Arts and Science provides the preliminary training necessary for admission to the various graduate schools and, in some cases, notably in teaching and journalism, prepares directly for a profession. Since a large proportion of the graduates of the College of Arts and Science of Lehigh University continue their work in graduate schools, the College offers a number of course combinations designed to give preliminary training for the various fields of medicine, dentistry, public health, law, theology, engineering, business administration, etc. Students who are looking forward toward any one of the graduate schools should consult the dean of the College, who will assist them to plan their courses. Illustrative combinations are listed below.

**Preparation for Schools of Medicine, Dentistry,  
and Public Health**

The leading medical schools require a college degree for entrance. They also demand preparation in certain subjects, specifically: from twelve to twenty-four semester hours of chemistry, at least eight semester hours of physics, and from eight to twelve hours of biology; a reading knowledge of one or more languages, usually German or French or both. The sequence of science courses outlined below is based on these requirements and includes a major in biology. In general, the College believes that the prospective physician should have a broad background and not be over specialized.

FIRST SEMESTER	FRESHMAN YEAR		SECOND SEMESTER
Title	Cr. Hrs.	Title	Cr. Hrs.
Elementary Chemistry .....		Stoichiometry .....	1
or Intermediate Chemistry .....	2	Qualitative Analysis .....	3
Chemistry Laboratory .....	2	Mammalian Anatomy .....	2
Zoology .....	3		

FIRST SEMESTER	SOPHOMORE YEAR		SECOND SEMESTER
Quantitative Analysis .....	3	Genetics .....	1
Quantitative Analysis Conf. ..	1		

FIRST SEMESTER	JUNIOR YEAR		SECOND SEMESTER
Inorganic Chemistry .....	3	Advanced Bacteriology .....	3
Bacteriology .....	3	Comparative Anatomy .....	3
Introduction to Physics .....	3	General Physics .....	5

FIRST SEMESTER	SENIOR YEAR		SECOND SEMESTER
Embryology .....	3	Physiology .....	3
Immunology .....	3	Histology .....	3
Organic Chemistry .....	3	Organic Chemistry .....	3
Organic Chemistry Laboratory .....	2		

The major in public health is similar to the program arranged for pre-medical students with the exception that less anatomy is taken and in its place advanced courses in public sanitation and serology are elected.

Students looking forward to dentistry are advised to complete the four-year college course. The work prescribed is the same as for medicine. For students who are unable to spend four years in preparation, special programs covering two or three years will be arranged.

The professor of biology is the official adviser of students preparing for medicine.

### **Preparation for Law Schools**

In general the law schools do not specify any particular preparation beyond that required for a B.A. or B.S. degree. The prospective law student should major in the field which most interests him but should at all events elect courses in English, history, government, economics, and psychology. Latin is not essential but is strongly recommended. At least one course in accounting should be elected by students who are planning to enter corporation law as a profession.

### **Preparation for Teaching**

Students who expect to teach upon graduation should consult with the department of education early in their college course. A license or certificate is required of everyone who teaches in the public schools of Pennsylvania or of any other state. The approved certificate in Pennsylvania for college graduates is the college provisional certificate granted upon completion of twenty-one semester hours of professional or pedagogical courses (including elementary psychology) and a minimum of eighteen semester hours in each subject which the candidate expects to teach. The twenty-one semester hours of professional studies are apportioned as follows:

FIRST SEMESTER Title	FRESHMAN YEAR Cr. Hrs.	SECOND SEMESTER Title	Cr. Hrs.
		Psychology .....	3
FIRST SEMESTER Introduction to Teaching .....	SOPHOMORE YEAR 3	SECOND SEMESTER Educational Psychology .....	3
FIRST SEMESTER High School Teaching .....	JUNIOR YEAR 3	SECOND SEMESTER Education in Europe .....	3
		or Secondary Education..... or Visual Instruction .....	
FIRST SEMESTER Observation of Teaching .....	SENIOR YEAR 3	SECOND SEMESTER Practice Teaching .....	3

This program may be modified to meet individual needs or the specific requirements of states other than Pennsylvania.

A student who is preparing to teach should major in the subject he prefers to teach, or in education. Practice teaching is done mainly in the Bethlehem High School; but observation, practice, and substitute teaching may be done in elementary schools in Bethlehem and elsewhere. The department of physical education offers courses for students who anticipate coaching and supervision of physical education.

### Preparation for Journalism

Students who plan to enter the field of journalism directly or through the medium of the Graduate School should choose for their field of concentration the major in journalism offered by the College of Arts and Science.

The program of courses required and the sequence advised is as follows:

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>	<i>Cr. Hrs.</i>
Reporting .....	3	Advanced Reporting .....	3		
Drama .....	3	Drama .....	3		
Economics .....	3	Economics .....	3		
Brown and White .....	1	Brown and White .....	1		

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER	
<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>	<i>Cr. Hrs.</i>
Feature Writing .....	3	Newspaper Problems .....	3		
or Editorial Writing .....	3	or History of American Journalism .....	3		
Copyreading .....	3				
Marketing .....	3	Public Finance .....	3		
National Government .....	3	Advertising .....	3		
American Foreign Policy .....	3	State Government .....	3		
Brown and White .....	1	American Foreign Policy .....	3		
		Brown and White .....	1		

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>	<i>Cr. Hrs.</i>
Editorial Writing .....	3	History of American Journ. ....	3		
or Feature Writing .....	3	or Newspaper Problems .....	3		
Labor Problems .....	3	Journalism Proseminar .....	3		
Sociology .....	3	Sociology .....	3		
English Elective .....	3	English Elective .....	3		
Municipal Management .....	3	Municipal Management .....	3		
or Elective .....	3	or Elective .....	3		
Brown and White .....	1	Brown and White .....	1		

### Preparation for Public Service

There is at present in the United States a limited number of opportunities for administrative careers in the public service for men who have acquired a liberal arts degree and have done graduate work in the social sciences.

The essentials of undergraduate preparation for the several categories of public service, whether professional, scientific, administrative, or non-professional, are substantially the same as for the corresponding classifications in the field of private enterprise. The undergraduate should acquire a knowledge of political, economic, and social institutions, procedures, and processes. He should also acquire proficiency in the use of certain techniques, such as oral and written English, accounting, statistics, and library methods.

Students who are preparing for public service must meet the distribution and major requirements of the College. Two illustrative sequences based upon a major in government are listed

below. Other combinations may be arranged to meet specific needs.

### Preparation for the Foreign Service

FIRST SEMESTER Title	SOPHOMORE YEAR Cr. Hrs.	SECOND SEMESTER Title	Cr. Hrs.
European History .....	3	European History .....	3
United States History .....	3	United States History .....	3
Accounting .....	3	Accounting .....	3
		Economic Geography .....	3

FIRST SEMESTER	JUNIOR YEAR	SECOND SEMESTER	
American Government .....	3	American Government .....	3
Diplomacy in the 19th and 20th Centuries .....	3	International Politics .....	3
American Foreign Policy .....	3	American Foreign Policy .....	3
Statistical Method .....	3	Business Law .....	3

FIRST SEMESTER	SENIOR YEAR	SECOND SEMESTER	
International Law .....	3	International Law .....	3
Hispanic America in the 19th Century .....	3	Hispanic America in the 20th Century .....	3
Foreign Exchange .....	3	Banking and Credit Policies .....	3

The examinations for entrance into the foreign service also include one modern language (French, Spanish, or German); the history of the Far East; and commercial and maritime law.

### Preparation for the Profession of City Manager

FIRST SEMESTER Title	SOPHOMORE YEAR Cr. Hrs.	SECOND SEMESTER Title	Cr. Hrs.
American Government .....	3	American Government .....	3
United States History .....	3	United States History .....	3
Accounting .....	3	Accounting .....	3

FIRST SEMESTER	JUNIOR YEAR	SECOND SEMESTER	
Municipal Government .....	3	Municipal Administration .....	3
Sociology .....	3	Sociology .....	3
Social Psychology .....	3	Public Finance .....	3

FIRST SEMESTER	SENIOR YEAR	SECOND SEMESTER	
Contemporary Political Thought .....	3	Contemporary Political Thought .....	3
Statistical Method .....	3	Public Utilities .....	3
Psych. of Industrial Personnel .....	3	Personnel Administration .....	3
Cost Accounting .....	3	Sanitary Bacteriology .....	3

### Preparation for Engineering

If a student in the College of Arts and Science contemplates becoming a candidate for a degree in engineering after the completion of his B.A. curriculum, he should major in mathematics, business, physics, or chemistry, and choose as electives such technical studies as are contained in the earlier years of the engineering curriculum which he wishes to complete. By carefully selecting electives, with the advice and guidance of the dean of the College and the professor in charge of the engineering curriculum concerned, the graduate of the B.A. curriculum may enter the

engineering curriculum chosen in full standing, and obtain his engineering degree in one or two years of further study. A detailed plan is made for each student.

#### **Preparation for Business Administration**

Students who are looking forward to further work in an undergraduate or graduate school of business administration, or students who plan to enter business directly upon completion of their curriculum in arts and science should major in the field of their special interests but should elect at least three one-year courses in economics or business administration beyond the introductory economics.

#### **Preparation for Actuarial Science**

Students who are interested in preparation for actuarial work with insurance companies or elsewhere should plan to major in mathematics and follow the plan outlined below:

FIRST SEMESTER	FRESHMAN YEAR	SECOND SEMESTER
<i>Title</i>	<i>Cr. Hrs.</i>	<i>Title</i>
Algebra and Analytic Geometry	3	Analytic Geometry and Calculus
		3
FIRST SEMESTER	SOPHOMORE YEAR	SECOND SEMESTER
Calculus .....	3	Intermediate Calculus .....
Mathematics of Finance .....	3	Mathematics of Statistics .....
Economics .....	3	Economics .....
		3
FIRST SEMESTER	JUNIOR YEAR	SECOND SEMESTER
Advanced Algebra .....	3	Mathematics of Life Insurance
Accounting .....	3	3
FIRST SEMESTER	SENIOR YEAR	SECOND SEMESTER
Finite Differences .....	3	Theory of Errors .....
Advanced Economics .....	3	Advanced Economics .....
		3

#### **Preparation for Other Fields**

The various major sequences outlined on pages 53 to 65 provide intensive work in the subjects represented and prepare directly for graduate study.

#### **The Curriculum**

The curriculum is based upon the principles of distribution and concentration. The object of the distribution requirements is to give the student an elementary knowledge of the fields of contemporary thought and to orient him in the world of man and nature. These requirements are coordinated with the work of the preparatory schools, the number and nature of the prescribed courses to be taken in college being dependent upon the subjects presented for entrance.

**The Distribution Requirements**

The distribution requirements are divided into three groups.

**GROUP I. HUMANITIES**

1. **ENGLISH.** Twelve semester hours. These are normally Engl. 1 and 2, Composition and Literature, and Engl. 4 and 5, Study of the Drama. Students who demonstrate satisfactory ability in written composition in their placement examinations may satisfy this English requirement by passing Engl. 3a and 3b, Types of World Literature, or an equivalent.

2. **FOREIGN LANGUAGE.** A reading knowledge of Latin, Greek, French, Spanish, or German and an elementary knowledge of a second of these languages are required of all students. The requirement takes into consideration work done in the preparatory schools and may be met in the following ways:

Reading knowledge. Students may satisfy this requirement by examination; otherwise, students who offer three or four years of Latin, French, Spanish, Greek, or German at entrance satisfy this requirement by passing Lat. 1, 2, Pliny and Horace, Gk. 7, Thucydides, and Gk. 8, Tragedy, Fr. 13, 14, Types of French Literature, or Fr. 21, 22, Seventeenth and Eighteenth Century French Literature, Sp. 21, 22, Spanish Novels and Plays, or Ger. 10, Goethe's Faust, in course; those who offer only two years of Latin, Greek, French, Spanish, or German continue for two years the language presented. With the permission of the dean of the College, such students may substitute one of the other four languages. Students who offer two years of two or more languages, Latin, Greek, French, Spanish, or German, may choose from these the language they are to continue.

Elementary knowledge. The elementary knowledge may be established by examination at entrance or later, or by passing Lat. 31, Beginning Latin, and Lat. 32, Caesar, Gk. 1, 2, Elementary Greek, Fr. 1, 2, Elementary French, Sp. 1, 2, Elementary Spanish, Ital. 1, 2, Elementary Italian, or Ger. 1, 2, Elementary German, or any higher course in these languages.

3. **ANCIENT CIVILIZATION OR FINE ARTS.** Six semester hours. This requirement may be reduced to three hours if the student presents at entrance a year course in ancient history.

4. PHILOSOPHY OR MATHEMATICS. Six semester hours. If the student presents at entrance courses in solid geometry and plane trigonometry or equivalent the requirements may be reduced to three hours.

### GROUP II. NATURAL SCIENCE

1. PHYSICAL SCIENCE. Nine semester hours to be chosen from three of the fields: chemistry, physics, geology, or astronomy. This requirement may be reduced to three hours if the student presents at entrance two of these sciences, or to six hours if he presents one.

2. BIOLOGICAL SCIENCE. Six semester hours to be selected from general biology, bacteriology, botany, paleontology, or zoology. This requirement may be reduced to three hours on the basis of entrance credit.

3. PSYCHOLOGY. Three semester hours.

### GROUP III. SOCIAL SCIENCE

1. ECONOMICS. Six semester hours. The requirement may be met by entrance credit for one year of economics.

2. GOVERNMENT. Three semester hours.

3. EDUCATION, HISTORY, OR SOCIOLOGY. Nine semester hours. This requirement may be reduced to three hours on the basis of entrance credit.

Distribution requirements should be met as far as possible during the freshman and sophomore years. Electives during these years should be used as orientation courses for the purpose of enabling the student to discover his major interests.

### Concentration Requirements

During the second semester of the freshman year each student must select some sequence of studies as his major field. A major consists of at least twelve semester hours of advanced work in the field chosen. Including preliminary college work, the minimum number of hours constituting a major is twenty-four. Change of major is permitted up to the end of the sophomore year. Majors must be approved by the professors concerned and the dean of the College.

The major work is designed to enable a student to master his chosen field so far as that is possible in the two years devoted to the subject. In all fields certain courses are prescribed but the mere passing of courses will not satisfy the major requirements. It is expected that the student will read widely in his subject and prepare himself largely through his own reading and his own independent work for his final comprehensive examination. After a student has selected a major subject, the head of the department in which the major is selected becomes the official adviser of the student and guides him in his choice of courses.

#### **Comprehensive Examination**

A comprehensive examination in the major subject is required of all students. This examination is given at the end of the senior year and may be oral or written or both. The comprehensive examination is given under the direction of the head of the major department; at least two university teachers, and, whenever possible, representatives of at least two departments take part in the examination.

#### **Unscheduled Work**

On the advice of the head of the department in which the major work is being done and with the consent of the dean of the College, a senior of unusual merit who wishes to concentrate in his chosen field may be allowed to substitute not more than six hours of unscheduled work per semester for six hours of elective work otherwise required for graduation.

#### **Special Honors**

Special honors are awarded at the end of the senior year, on recommendation of the head of the department concerned and by vote of the faculty, to students who have done advanced work of unusual merit in some chosen field. Candidates for special honors must indicate during their junior year their intention to work for such honors. Awards are based on grades obtained in the subject chosen, the results in extra work assigned, and the general proficiency of the candidate as evidenced by either a final examination or a thesis, as the head of the department involved may direct. No student who fails to pass his comprehensive examination with distinction is graduated with special honors.

## Details of Concentration Requirements

### MAJOR SEQUENCES

1. BIOLOGY. Three majors are offered by the department of biology: zoology, botany, and bacteriology.

a. Zoology. This major is designed for men who intend to enter medical school or to continue advanced instruction in a graduate school. The required courses in zoology are:

Biol. 10.	Zoology .....	(3)
Biol. 2.	Mammalian Anatomy .....	(2) or
Biol. 3.	Comparative Anatomy .....	(3)
Biol. 6.	Botany .....	(3)
Biol. 18.	Genetics .....	(2)
Biol. 54.	Bacteriology .....	(3)
Biol. 104.	Embryology .....	(3)
Biol. 153.	Advanced Bacteriology .....	(3)
Biol. 20.	Physiology .....	(3)
Biol. 113.	Histology .....	(3)
Biol. 158.	Immunology .....	(3)

b. Botany. This major is for men who intend to enter the teaching profession, or to do research in agriculture or in the economic phases of the science. The required courses are:

Biol. 10.	Zoology .....	(3)
Biol. 6.	Botany .....	(3)
Biol. 18.	Genetics .....	(2)
Biol. 54.	Bacteriology .....	(3)
Biol. 36.	Economic Botany .....	(3)

c. Bacteriology. This major is for men who intend to go into public health work or bacteriology either upon graduation or in pursuance of graduate study. The required courses are:

Biol. 10.	Zoology .....	(3)
Biol. 6.	Botany .....	(3)
Biol. 18.	Genetics .....	(2)
Biol. 54.	Bacteriology .....	(3)
Biol. 153.	Advanced Bacteriology .....	(3)
Biol. 113.	Histology .....	(3)
Biol. 158.	Immunology .....	(3)

*Optional*

Biol. 155.	Industrial Bacteriology .....	(3)
Biol. 161.	Public Sanitation .....	(3)

All students taking a biology major will elect the following courses as collateral subjects: Chem. 1, 8, 9, 11, 20, 30, 41, 150, 151, and 165; Physics 12, 16, and 17. A reading knowledge of both French and German should be attained before graduation.

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## 2. CHEMISTRY

Chem. 1 or 3.	Elementary Chemistry or Inter. Chem.	(2)
Chem. 11 or 13.	Chemistry Laboratory .....	(2)
Chem. 8.	Stoichiometry .....	(1)
Chem. 20.	Qualitative Analysis .....	(3)
Chem. 6.	Inorganic Chemistry .....	(3)
Chem. 7.	Physical Chemistry .....	(3)
Chem. 30, 31.	Quantitative Analysis .....	(6)
Chem. 41, 45.	Quantitative Analysis Conference .....	(2)
Chem. 150, 151.	Organic Chemistry .....	(6)
Chem. 165, 167.	Organic Chemistry Laboratory .....	(4)
Chem. 190.	Physical Chemistry .....	(3)
Chem. 193.	Physical Chemistry Laboratory .....	(2)
Chem. 194.	Physical Chemistry and Electrochemistry .....	(3)
Chem. 197.	Electrochemistry Laboratory .....	(1)

*Required Collateral Courses*

Phys. 12.	Introduction to Physics .....	(3)
Phys. 16.	General Physics .....	(3)
Phys. 17.	General Physics Laboratory .....	(2)
Math. 11.	Algebra and Analytic Geometry .....	(3)
Math. 12.	Analytic Geometry and Calculus .....	(3)
Math. 13.	Calculus .....	(3)

*Suggested Electives*

Chem. 158, 159.	Advanced Organic Chemistry .....	(6)
Gk. 99.	Ancient Science .....	(3)

## 3. BUSINESS ADMINISTRATION AND ECONOMICS

### A. Major in Social Institutions

**SOPHOMORE YEAR**

Eco. 3, 4.	Economics .....	(6)
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**JUNIOR YEAR**

Soc. 51.	Social Institutions .....	(3)
Fin. 126.	Public Finance .....	(3)
Eco. 107, 108.	Advanced Economics .....	(6)
E.S. 145.	Statistical Method .....	(3)
E.S. 146.	Business Cycles and Forecasting .....	(3)

**SENIOR YEAR**

Eco. 133, 134.	Labor Problems .....	(6)
Soc. 161, 162.	Sociology and Social Problems .....	(6)
Soc. 171, 172.	Readings in Sociology .....	(6)

*Suggested Electives*

Fin. 135.	Transportation .....	(3)
Fin. 136.	Public Utilities .....	(3)
Govt. 157.	Municipal Government .....	(3)
Govt. 158.	Municipal Administration .....	(3)
Psych. 104.	Social Psychology .....	(3)
Govt. 62.	International Relations .....	(3)
Journ. 18.	History of American Journalism .....	(3)

### B. Major in Economics

**SOPHOMORE YEAR**

Eco. 3, 4.	Economics .....	(6)
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**JUNIOR YEAR**

Eco.	107, 108.	Advanced Economics .....	(6)
Fin.	29, 30.	Money and Banking.....	(6)
E.S.	145.	Statistical Method .....	(3)
E.S.	146.	Business Cycles and Forecasting.....	(3)

**SENIOR YEAR**

Fin.	135.	Transportation .....	(3)
Fin.	136.	Public Utilities .....	(3)
Eco.	60.	Insurance .....	(3)
Fin.	126.	Public Finance .....	(3)
Eco.	133.	Labor Problems .....	(3)
Soc.	162.	Social Problems .....	(3)

*Suggested Electives*

Eco.	11, 12.	Marketing .....	(6)
I.E.	2, 3.	Industrial Management .....	(6)
Soc.	161.	Sociology .....	(3)
Govt.	62.	International Relations .....	(3)
Govt.	157.	Municipal Government .....	(3)
Govt.	158.	Municipal Administration .....	(3)

**C. Major in Finance**

**SOPHOMORE YEAR**

Eco.	3, 4.	Economics .....	(6)
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**JUNIOR YEAR**

Fin.	21, 22.	Corporation Finance .....	(6)
Fin.	29, 30.	Money and Banking .....	(6)
E.S.	145.	Statistical Method .....	(3)
E.S.	146.	Business Cycles and Forecasting.....	(3)

**SENIOR YEAR**

Fin.	123.	Investments .....	(3)
Fin.	126.	Public Finance .....	(3)
Fin.	125.	Transportation .....	(3)
Fin.	136.	Public Utilities .....	(3)
Eco.	60.	Insurance .....	(3)
Eco.	134.	Labor Problems .....	(3)

*Suggested Electives*

Acctg.	1, 2.	Accounting .....	(6)
Acctg.	113, 114.	Advanced Accounting .....	(6)
Eco.	107, 108.	Advanced Economics .....	(6)
Eco.	133.	Labor Problems .....	(3)
Fin.	131.	Foreign Trade and Exchange .....	(3)
Fin.	132.	Banking and Credit Policies .....	(3)
Fin.	171, 172.	Readings in Finance .....	(6)

**D. Major in Accounting**

**SOPHOMORE YEAR**

Eco.	3, 4.	Economics .....	(6)
Acctg.	1, 2.	Accounting .....	(6)

**JUNIOR YEAR**

Acctg.	115.	Cost Accounting .....	(3)
Acctg.	118.	Advanced Cost Accounting .....	(3)
Fin.	21, 22.	Corporation Finance .....	(6)
Law	2.	Business Law .....	(3)

ARTS AND SCIENCE

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**SENIOR YEAR**

Acctg. 113, 114.	Advanced Accounting .....	(6)
Law 103.	Federal Tax Law .....	(3)
Law 102.	Business Law .....	(3)
Acctg. 120.	Auditing .....	(3)

*Suggested Electives*

*Acctg. 171.	Readings in Accounting .....	(3)
E.S. 145.	Statistical Method .....	(3)
E.S. 146.	Business Cycles and Forecasting .....	(3)
Eco. 107, 108.	Advanced Economics .....	(6)
I.E. 2, 3.	Industrial Management .....	(6)
C.E. 100.	Engineering Valuation and Economy .....	(3)
*Fin. 123.	Investments .....	(3)

\* Essential for students preparing for C.P.A. work.

#### 4. EDUCATION

Educ. 1.	Introduction to Education .....	(3)
Educ. 20.	Educational Psychology .....	(3)
Educ. 51.	Principles of High School Teaching .....	(3)
Educ. 53.	Observation of Secondary School Teaching .....	(3)
Educ. 54.	Practice Teaching of Sec. School Subjects .....	(3)
Educ. 131.	History of Education in the United States .....	(3)
Educ. 150.	Principles of Secondary Education .....	(3)
Educ. 151.	Organization of Materials of Instruction .....	(3)
	Electives .....	(6)

#### 5. ENGLISH

##### A. English Literature

Students looking forward to teaching English, or taking graduate courses for advanced degrees, should register for Engl. 123, 124, and elect eighteen additional hours from the list below. Students wishing to prepare a thesis for honors should elect in addition Engl. 81, 82.

Engl. 81, 82.	Undergraduate Thesis .....	(6)
Engl. 83, 84.	Readings in English Literature .....	(6)
Engl. 123, 124.	Shakespeare and the Elizabethan Drama .....	(6)
Engl. 125.	English Literature of the Romantic Era .....	(3)
Engl. 126.	English Literature of the Victorian Era .....	(3)
Engl. 130.	The Renaissance .....	(3)
Engl. 131.	Milton .....	(3)
Engl. 132.	Restoration and Augustan Literature .....	(3)
Engl. 134.	Age of Johnson .....	(3)

##### B. English and Journalism

Students who do not expect to specialize in English language and literature, but are interested in taking a major in English that may include courses in dramatics and journalism should arrange for twenty-four hours from the list below, twelve hours of which shall be from the "100" group. Students wishing to prepare a thesis for honors should elect in addition Engl. 81, 82.

Engl. 121.	Contemporary American Literature.....	(3)
Engl. 122.	Contemporary English Literature.....	(3)
Engl. 123, 124.	Shakespeare and the Elizabethan Drama.(6)	
Engl. 125.	English Literature of the Romantic Era.(3)	
Engl. 126.	English Literature of the Victorian Era.(3)	
Journ. 21.	Writing for Publication.....	(3)
Journ. 22.	The Short Story .....	(3)
Engl. 8, 9.	English Literature .....	(6)
Engl. 18, 19.	The Novel .....	(6)
Engl. 20.	American Literature, 1607-1855.....	(3)
Engl. 21.	Modern American Literature.....	(3)
Engl. 81, 82.	Undergraduate Thesis .....	(6)
Engl. 83, 84.	Readings in English Literature.....	(6)
Speech 61, 62.	Dramatics .....	(6)
Journ. 15.	Editorial Writing and Modern Problems .....	(3)
Journ. 14.	Newspaper Feature Writing and News Photography .....	(3)
Journ. 18.	History of American Journalism.....	(3)

### C. Journalism

The prerequisites for a major in journalism are Engl. 1 and 2, Freshman Composition, or Engl. 3a and 3b, Types of World Literature.

The major proper is elected from the following courses:

.	English Literature .....	(6)
Journ. 11.	Newspaper Reporting and Writing.....	(3)
Journ. 12.	Advanced Newspaper Reporting and Writing.....	(3)
Journ. 13.	Newspaper Editing and Copyreading.....	(3)
Journ. 14.	Newspaper Feature Writing and News Photography .....	(3)
Journ. 15.	Editorial Writing and Modern Problems.....	(3)
Journ. 16.	Newspaper Problems and Policies.....	(3)
Journ. 20.	Journalism Proseminar .....	(3)
Journ. 1-4	Brown and White four semesters.....	(4)

The collateral courses suggested for the major in journalism are as follows: Eco. 3, 4, Economics; Soc. 161, 162, Sociology; Govt. 51, 52, American Government; Hist. 25, 26, Modern European History; or Hist. 129, 130, American Foreign Policy; and one of the following: Govt. 157, Municipal Government; Govt. 158, Municipal Administration; Eco. 133, 134, Labor Problems; or Eco. 11, Marketing, and Eco. 113, Advertising.

### 6. FINE ARTS

A student majoring in fine arts is expected to have the introductory courses, F. A. 11, Ancient and Medieval Art, and F. A. 12, The Art of the Italian Renaissance.

The major proper consists of the following:

F.A. 3, 4.	History of Architecture.....	(6)
F.A. 13.	The Art of the Northern Renaissance.....	(3)
F.A. 14.	Modern Art .....	(3)
F.A. 17, 18.	Criticism and Analysis of Art.....	(6)

Freehand Drawing (F. A. 5, 6) and Prints and Print Processes (F. A. 19) are not required of students majoring in fine arts but are recommended as a help toward appreciation. As collateral courses Mus. 3, 4, Appreciation of Music, and Phil. 109, The Theory of Art and of Beauty are advised. Students should have as much background in history as possible and a reading knowledge of a foreign language is valuable.

## 7. GEOLOGY

The prerequisites for students majoring in geology are: Geol. 10, Principles of Geology, Geol. 1, Mineralogy, Geol. 5, Petrology, Geol. 8, Historical Geology, altogether a total of 11 or more hours. These prerequisites should be completed by the end of the sophomore year.

The major proper consists of the following courses:

Geol. 107.	Non-metallic Economic Geology.....	(2)
Geol. 108.	Metallic Economic Geology.....	(3)
Geol. 109.	Paleontology .....	(3)
Geol. 110.	Stratigraphy and Sedimentation.....	(3)
Geol. 111.	Field Geology .....	(2)
Geol. 114.	Structural Geology .....	(3)
Geol. 116.	Geology Proseminar .....	(1)
Geol. 118.	Geology of Mineral Fuels.....	(3)

Certain variations in the major courses are advised depending upon the branch of geology in which the individual student is particularly interested. The same factor will affect materially the collateral courses advised. Students majoring in geology should consult the department head on these matters.

Geol. 109, 110, 114 should be taken during the junior year, and Geol. 107, 108, 111, and 118 during the senior year. The Geology Proseminar, Geol. 116, is taken during each semester of the senior year and is recommended also during each semester of the junior year. Other available courses are: Geol. 9, Engineering Geology, Geol. 18, Meteorology and Climatology, Geol. 101, Applied Mineralogy Laboratory, Geol. 117, Geochemistry, Geol. 123, Optical Crystallography, Geol. 124, Petrography, Geol. 128, Crystal Structure, and Geol. 171 and 172, Geological Problems.

### 8. GERMAN

The prerequisite for a major in German is Ger. 10, Goethe's Faust, Part I, or a knowledge of German which is equivalent.

The major proper consists of the following courses:

Ger. 22.	Conversation and Composition.....	(3)
Ger. 111, 112.	Nineteenth Century German Drama.....	(6)
Ger. 113, 114.	Lessing, Goethe, and Schiller.....	(6)
Ger. 115, 116.	The German Short Story.....	(6)

Shakespeare, Engl. 123, 124, and European History, Hist. 25, 26, are recommended as collateral courses. A thorough knowledge of Latin is desirable.

In addition to the collateral reading assigned in connection with the major courses, the students will be expected to have a knowledge of the history of German literature. A list of readings in English and German is furnished the student at the beginning of his major work.

### 9. GREEK

The major in Greek for those students who have begun Greek in college consists of the following courses:

Gk. 1, 2.	Elementary Greek .....	(6)
Gk. 3, 4.	Second-year Greek .....	(6)
Gk. 7.	Thucydides .....	(3)
Gk. 8.	Greek Tragedy .....	(3)
Gk. 15.	Homer and Herodotus .....	(3)
Gk. 16.	Plato .....	(3)
or equivalent courses as offered.		

Students who have presented the full amount of preparatory Greek at entrance will take Gk. 15, 16, 7, and 8 in the freshman and sophomore years, and Gk. 9, Dramatic Poetry, Gk. 10, Greek Oratory, Gk. 11, Homer, Gk. 12, Lyric Poetry, or Gk. 13, Hellenistic Greek, during the last two years.

### 10. HISTORY AND GOVERNMENT

All students majoring in history and government are recommended to elect Hist. 25 and 26, European History. This should be done as early as possible.

The following groups are offered by the department in fulfillment of the major requirement:

a. The American History group. Those selecting the American history group will be expected to register for (a) Hist. 13 and 14, United States History; (b) Hist. 27 and 28, European Expansion and Empire Building; (c) Hist. 129 and 130, American Foreign Policy, or Hist. 139 and 140, The American Civil War and the Reconstruction of the Union, or Hist. 149 and 150, Hispanic America in the Nineteenth and Twentieth Centuries; (d) Hist. 119 and 120, Senior Proseminar, which will study the British Empire before the American Revolution.

b. The European History Group. Those selecting the European history group will be expected to register for (a) Hist. 25 and 26, European History; (b) Hist. 29 and 30, Modern Europe, or Hist. 115 and 116, Political and Social History of England; (c) Hist. 27 and 28, European Expansion and Empire Building, or Hist. 119 and 120, the Senior Proseminar on the British Empire before the American Revolution; (d) Hist. 135 and 136, The Cultural History of Western Europe.

c. The Government Group. Those selecting the government group will be expected to register for (a) Govt. 51 and 52, American Government (National and State); (b) Govt. 163 and 164, Contemporary Political Thought; (c) twelve hours from the following group of courses: Govt. 61 and 62, Diplomacy in the Nineteenth and Twentieth Centuries and International Politics; Govt. 151, The American Constitutional System; Govt. 157 and 158, Municipal Government and Administration; Govt. 161 and 162, International Law; Hist. 119 and 120, Proseminar; Hist. 129 and 130, American Foreign Policy, Hist. 160, History of American Political Parties.

d. The International Relations Group. Those selecting the international relations group will be expected to register for Govt. 1, The Foundations of Government and Hist. 29 and 30, Modern Europe. For the comprehensive examinations choose one subject out of the following groups: (a) Govt. 61 and 62, Diplomacy and International Relations, one year preceding (b) Govt. 161 and 162, International Law; (c) Hist. 129 and 130, American Foreign Policy; or Hist. 149 and 150, Hispanic America in the Nineteenth and Twentieth Centuries; or Hist. 179 and 180, The Far East Since 1800; (d) Hist. 27 and 28, European Expansion and Empire Building, or Hist. 119 and 120, The British Empire in the Eighteenth Century.

### 11. LATIN

Students majoring in Latin will be expected to present as preliminary work Lat. 1a, Pliny, or 1b, Vergil; Lat. 2, Horace; Lat. 4, Livy, and Lat. 13, Latin Drama, or equivalent. The major proper consists of the following courses: Lat. 105, Satire, Lat. 106, Roman Prose Writers of the Empire, Lat. 107, *Aeneid*, Books VII-XII, and Lat. 108, Lucretius. The courses are given in alternate years, and are open to both juniors and seniors.

In addition to the courses specified above, students majoring in Latin must elect Lat. 125, Latin Literature in English Translation, and are advised to elect (preferably in the junior year) the course in Ancient History (Lat. 21 and 22). Instead of Lat. 22, majors may elect Lat. 121 and 122, the advanced courses in Roman History.

### 12. MATHEMATICS

#### A. The Major in Mathematics

The formal requirement of the major in mathematics is thirty semester hours of college credit in mathematics. This must include Math. 106, Advanced Calculus, and Math. 51, Advanced Algebra. The twelve hours advanced credit required by the regulations of the College of Arts and Science must be from mathematics courses given at Lehigh University other than Math. 1, 1a, 1b, 11, 11a, 12, 13, 14, 15, 16, 20, 23, and 40.

#### B. The Major in Mathematics and Astronomy

The major in mathematics and astronomy consists of thirty semester hours of college credit in mathematics and astronomy. It must include Math. 14, Intermediate Calculus, Astr. 2, General Astronomy, and Astr. 3, Practical Astronomy. The twelve hours advanced credit required shall not include Math. 1, 1a, 1b, 11, 12, 13, 14, 15, 16, or Astr. 1.

#### C. The Major in Actuarial Science

A major in actuarial science is offered within the department of mathematics. The graduate should be able to pass the examinations for associate in the Actuarial Society of America. The major consists of Math. 11, 12, 13, 14, 15, 40, 42, 43, 51, 124, Acctg. 1, 2, Fin. 25, Eco. 3, 4, 107, and 108.

### 13. PHILOSOPHY

The subject of philosophy may be chosen as a major on one of these two distinct bases:

(1) The student may recognize philosophy as the study of how to correlate his other studies, so that each of them may profit by the inspiration and the standard of criticism that comes from a unified outlook. Such a student should, as a rule, give about twelve hours to philosophy, including the History of Philosophy (6), with either Logic or Ethics (3), and either the Theory of Nature, the Theory of Art and of Beauty, or the Theory of Social Relations (3).

(2) The student who is drawn to philosophy as a culminating study may well give to it as many as twenty-four hours, including the subjects mentioned above, with six hours in Contemporary Philosophy and six hours in "Readings." The actual selection will vary with the individual student.

### 14. PHYSICS

Students majoring in physics should offer as prerequisite courses Phys. 12, Introduction to Physics, Phys. 16, General Physics. Phys. 17, General Physics, Laboratory, or preferably, Phys. 22, Mechanics and Light, Phys. 23, Dynamics and Heat, and Phys. 24, Electricity and Magnetism, and mathematics including Elementary Calculus, Math. 13.

A total of at least twelve hours of physics should be elected during the junior and senior years from the following courses:

#### JUNIOR YEAR

Phys. 120.	Electric Oscillations and Waves.....	(3)
Phys. 122.	Physical Optics and Spectroscopy.....	(3)
Phys. 124.	Electric Discharge through Gases.....	(3)
Phys. 126.	Pyrometry .....	(3)

#### SENIOR YEAR

Phys. 160, 161.	Intro. to Modern Physical Theories.....	(6)
Phys. 162, 163.	Intro. Theo. of Electricity and Magnetism.(6)	
Phys. 164, 165.	Advanced Laboratory .....	(2)

### 15. PSYCHOLOGY

The following recommendations are presented as a guide to majors in the department of psychology. The student may select any one of the following three fields.

## I. General Psychology

Designed to prepare for graduate work in the field.

(1) Required courses.

a. In psychology:

Psych. 1.	Elementary Psychology .....	(3)
Psych. 102.	Aptitude Testing .....	(3)
Psych. 110.	Learning and Motivation .....	(3)
Psych. 131.	Neurological Aspects of Behavior .....	(1)
Psych. 132.	Sensory Psychology .....	(2)
Psych. 133.	Complex Psychological Processes .....	(3)

and a minimum of nine hours to be selected from:

Psych. 15.	Industrial Psychology .....	(3)
Psych. 16.	Psychology in Business .....	(3)
Psych. 51.	Readings in Psychology .....	(3)
Psych. 101.	Psychology of Industrial Personnel .....	(3)
Psych. 104.	Social Psychology .....	(3)
Psych. 108.	Genetic Psychology .....	(3)
Psych. 109.	Abnormal Psychology .....	(3)
Psych. 111.	Minor Research .....	(3)
Psych. 112.	Minor Research .....	(3)
Psych. 117.	Personality .....	(3)

b. In a non-psychological subject: a three-hour course in a supporting field approved by the head of the department.

(2) Collateral subjects recommended: Math. 42, Mathematics of Statistics, six hours of biology, and elementary physics.

## II. Applied Psychology

Designed to prepare for psychological work in business and industry.

(1) Required courses.

a. In psychology:

Psych. 1.	Elementary Psychology .....	(3)
Psych. 102.	Aptitude Testing .....	(3)

and in addition six hours to be selected from:

Psych. 104.	Social Psychology .....	(3)
Psych. 110.	Learning and Motivation .....	(3)
Psych. 131.	Neurological Aspects of Behavior .....	(1)
Psych. 132.	Sensory Psychology .....	(2)
Psych. 133.	Complex Psychological Processes .....	(3)

and six hours to be selected from:

Psych. 15.	Industrial Psychology .....	(3)
Psych. 16.	Psychology in Business .....	(3)
Psych. 101.	Psychology of Industrial Personnel .....	(3)
Psych. 111.	Minor Research .....	(3)
Psych. 112.	Minor Research .....	(3)
Psych. 117.	Personality .....	(3)

b. In non-psychological subjects: not more than six hours in advanced subjects in allied fields. These must be approved by the head of the department.

(2) Collateral subjects recommended for this group are selected, in conference with the head of the department, in accord with the interests and goals of each student.

### III. Social Science Psychology

Designed to give cultural background, or to prepare for social service or governmental work.

(1) Required courses:

a. In psychology:

Psych. 1. Elementary Psychology .....	(3)
Psych. 104. Social Psychology .....	(3)

and in addition six hours to be selected from:

Psych. 108. Genetic Psychology .....	(3)
Psych. 110. Learning and Motivation .....	(3)
Psych. 131. Neurological Aspects of Behavior.....	(1)
Psych. 132. Sensory Psychology .....	(2)

Psych. 133. Complex Psychological Processes.....(3)

and six hours to be selected from:

Psych. 102. Aptitude Testing .....	(3)
Psych. 109. Abnormal Psychology .....	(3)
Psych. 117. Personality .....	(3)

b. In non-psychological subjects: not more than six hours in advanced subjects in allied fields. These must be approved by the head of the department.

(2) Collateral subjects recommended for this group are selected in conference with the head of the department. They are designed to provide for the specific needs of students who are interested in cultural content; social sciences; governmental, journalistic, economic, or social service work.

### 16. ROMANCE LANGUAGES

#### A. French

The prerequisites for students majoring in French are: Fr. 21, Seventeenth Century French Literature, and Fr. 22, Eighteenth Century French Literature.

The major proper consists of the following courses:

Fr. 31, 32. Nineteenth Century French Literature.....	(6)
Fr. 101. French Literature before the Seventeenth Century .....	(3)
Fr. 102. Contemporary French Literature.....	(3)
Fr. 103, 104. Proseminar .....	(6)

Recommended as collateral courses are the following:

Gk. 100.	Greek Literature in English Translation..	(3)
Lat. 125.	Latin Literature in English Translation..	(3)
Engl. 123, 124.	Shakespeare and the Elizabethan Drama..	(6)
Hist. 135, 136.	The Cultural History of Western Europe..	(6)

The student will be expected to complete supplementary readings, the list of which he will receive at the beginning of his major work, and to correlate the knowledge gained in courses and readings through the use of some recommended history of French literature.

### B. Spanish

The prerequisites for students majoring in Spanish are Sp. 21, 22, Spanish Novels and Plays.

The major proper consists of the following courses:

Span. 101.	Spanish Fiction of the Sixteenth and Seventeenth Centuries .....	(3)
Span. 102.	Spanish Drama of the Sixteenth and Seventeenth Centuries .....	(3)
Span. 103, 104.	Proseminar .....	(6)
Span. 111, 112.	Spanish-American Literature .....	(6)

Recommended as collateral courses are the following:

Gk. 100.	Greek Literature in English Translation..	(3)
Lat. 125.	Latin Literature in English Translation..	(3)
Engl. 123, 124.	Shakespeare and the Elizabethan Drama..	(6)
Hist. 135, 136.	The Cultural History of Western Europe..	(6)
Hist. 149.	Hispanic America in the Nineteenth Century .....	(3)

In addition to the outside readings and reports required in connection with these courses, the students will be expected to acquire a knowledge of the history of Spanish literature as a whole.

### Special Regulations for English

Students in the College of Arts and Science who persistently use poor English may be reported at any time to the dean of the College. He may require that they take additional English without credit toward graduation. Toward the end of the junior year each junior in the College of Arts and Science must report to the department of English for an exercise in impromptu writing. Students found seriously deficient in this test are reported to the dean of the College, who may require that they take additional English without credit toward graduation.

The College of  
Business Administration



## THE COLLEGE OF BUSINESS ADMINISTRATION

### Administrative Officers

Neil Carothers, *Dean of the College of Business Administration*

Wray Hollowell Congdon, *Dean of Undergraduates*

George Bartlett Curtis, *Registrar*

Earl Kenneth Smiley, *Director of Admissions*

### Faculty

Carl Elmer Allen.....	<i>Accounting</i>
Frederick Alden Bradford.....	<i>Finance</i>
Neil Carothers.....	<i>Economics and Sociology</i>
Roy Burford Cowin.....	<i>Accounting</i>
Herbert Maynard Diamond.....	<i>Economics and Sociology</i>

## THE COLLEGE OF BUSINESS ADMINISTRATION

The purpose of the curriculum in business administration is to provide a thorough and systematic training in the fundamentals of business. The College of Business Administration at Lehigh is comparatively new, and it has been possible to build the curriculum on the basis of the experience of other colleges of the kind.

The College of Business Administration undertakes, in its four-year curriculum, to provide a training in the fundamentals of business that will give the student an intelligent understanding

of business principles, an ability to analyze industrial facts, and a habit of thought that will enable him to cope with the problems that increasing executive responsibilities will bring him in later life. A college course cannot make business executives and industrial managers out of inexperienced college students, and no college course can provide a substitute for the training and experience which are to be gained only from actual contact with the complex problems of business. The College of Business Administration does not pretend to furnish such a substitute but to lay a foundation upon which a career in the field of business activity may be built.

In accordance with this plan of training in fundamentals, the student is required to learn the basic principles that underlie all business. No student is permitted to omit the courses in economics, economic history, accounting, corporation finance, money and banking, and statistical method which are fundamental to all business. Many students come to college with their choice of a future profession or field of business already determined, although this choice is often predicated upon the most inadequate grounds. The insistence of the business administration curriculum on an elementary training in all the fundamentals gives the student an invaluable means of discovering his real abilities and making a final choice of a profession. A major function of the curriculum in business administration is to aid students in their efforts to discover their best talents.

In addition to this principle of a generalized training in business fundamentals, there is an equally important principle that the training as a whole shall offer an education commensurate with the standards of a university. The curriculum permits no student to devote himself exclusively to business subjects. He must acquire at least a rudimentary acquaintance with the cultural and humanitarian aspects of the world around him, as well as at least a brief contact with science. Consequently a large part of the curriculum is devoted to work in liberal and scientific subjects. In the freshman year only one course is taken in the College of Business Administration. In the sophomore year the curriculum offers only two courses in business administration. Throughout the entire four years' work there is emphasis on the social aspects of the subjects considered. If a student develops alongside his business work a special interest in some such field as languages or

science, he is given opportunity, through electives or substitutions, to pursue this special line. Many students have, at graduation, done three or four years work in languages or chemistry or some such subject outside the business curriculum proper.

It has been emphasized that training in fundamentals constitutes the major objective of the curriculum. Specialization in one field of business at the expense of general training is not possible, while purely vocational and wholly commercial aspects of business are excluded from the curriculum. But every student has opportunity in the last two years, and especially in the senior year, to concentrate his work in some special field of business. The curriculum is so arranged that every student necessarily specializes in some degree, but these requirements give the student a wide choice of fields of work and combinations of courses.

Students planning careers in accounting take elementary accounting in their sophomore year. In their junior year they take cost accounting and advanced accounting, as well as the required courses in statistics, corporation finance, and money and banking, all of which are essential courses in connection with accounting. In the senior year they take one or more of the advanced courses in accounting and in addition usually elect investments, public finance, and business law. A student following this program of work has not specialized in accounting to the detriment of his general training, but he has the necessary background for a career in this field. Graduates of the College of Business Administration have been consistently successful in accounting, both public and private. Holders of the degree are eligible for work toward a C. P. A. certificate in any state.

Those students preparing for the managerial phases of business select courses to fit in with their particular individual needs. Normally they order their program so as to include labor problems, marketing, advertising, and industrial management. Students planning a career in merchandising usually arrange their curriculum to include the junior and senior courses in marketing, selling and sales management, and advertising, as well as business law and courses in psychology and in English. Students preparing for careers in the field of finance or investments take the courses in investments, public finance, banking and credit policies, and public utilities.

For students who are interested in the social and public aspects of business, with a view to pursuing graduate work in economics or to entering government service, an individual program is worked out from the courses in advanced economics, sociology, labor problems, and courses in government and history in the College of Arts and Science. It is now widely recognized that business curricula of the better type offer excellent preparation for law. Graduates of the College of Business Administration are accepted without question by the outstanding law schools of the country.

The College of Business Administration has certain other distinguishing features. One of these is the limited enrollment. The graduating class is relatively small, and all its members are known personally to the teaching staff. This gives every student exceptional opportunity to consult with individual professors in reference to his future work.

Perhaps the most distinctive feature of the work at Lehigh in business administration is the character of the class-work. Much of the work of the curriculum is taken in the College of Engineering and the College of Arts and Science, while students of these two Colleges in very large numbers avail themselves of the courses given in the College of Business Administration. There is no segregation of students by colleges, and students in business administration take their courses in competition with students trained in liberal arts and in the exact sciences. This condition has a marked influence on the standards of work and the quality of the student.

In times of normal business activity, students who have made creditable records may reasonably expect to receive one or more offers of positions before the date of their graduation. The College of Business Administration enjoys happy relations with many of the country's leading industries. Representatives regularly visit the campus to engage the service of students graduating in business administration. The University assumes no responsibility for finding positions for its graduates, but every effort is made by the College and by the university placement service to put its graduating students in touch with desirable opportunities for employment.

Graduates of this curriculum receive the degree of Bachelor of Science in Business Administration.

B U S I N E S S   A D M I N I S T R A T I O N

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**The Curriculum in Business Administration**

*Total Hours Required for Degree of B.S. in Business Administration: 128*

**I. REQUIRED COURSES (57 Hrs.)**

Course No.	Course Title	Cr. Hrs.	Course No.	Course Title	Cr. Hrs.
Acctg. 1.....	Accounting .....	3	Math. 40 .....	Math. of Finance..	3
Acctg. 2.....	Accounting .....	3	Mil. 21 .....	Military Science...	3
Eco. 1.....	Ind. Evolution....	3	Mil. 22 .....	Military Science...	3
Eco. 3.....	Economics .....	3	Mil. 23 .....	Military Science...	3
Eco. 4.....	Economics .....	3	Biol. 15 .....	Fr. Hygiene.....	—
Eco. 11.....	Marketing .....	3	M.R.Phil. 10 .....	Student Philosophy	—
Eco. 50.....	Eco. Geography....	3	P.E. 1.....	Physical Education	—
Engl. 1 or 3a.	Composition .....	3	P.E. 2.....	Physical Education	—
Engl. 2 or 3b.	Composition .....	3	P.E. 3.....	Physical Education	—
E.S. 145.....	Stat. Method....	3	P.E. 4.....	Physical Education	—
E.S. 146.....	Bus. Cycles .....	3	P.E. 5.....	Physical Education	—
Fin. 21.....	Corp. Finance....	3	P.E. 6.....	Physical Education	—
Fin. 22.....	Corp. Finance....	3	P.E. 7.....	Physical Education	—
Fin. 33.....	Money & Banking.	3	P.E. 8.....	Physical Education	—
Math. 1b .....	General Math.....	3			

**II. ADVANCED BUSINESS ADMINISTRATION OPTIONS (30 Hrs.)**

Course No.	Course Title	Cr. Hrs.	Course No.	Course Title	Cr. Hrs.
Acctg. 113.....	Adv. Accounting..	3	Fin. 123.....	Investments .....	3
Acctg. 114.....	Adv. Accounting..	3	Fin. 124.....	Investments .....	3
Acctg. 115.....	Cost Accounting..	3	Fin. 126.....	Public Finance....	3
Acctg. 118.....	Adv. Cost Acctg..	3	Fin. 131.....	Foreign Exchange	3
Acctg. 120.....	Auditing .....	3	Fin. 132.....	Bkg. & Credit Pol.	3
Acctg. 171.....	Readings in Acctg.	3	Fin. 135.....	Transportation .....	3
Acctg. 172.....	Readings in Acctg.	3	Fin. 136.....	Public Utilities....	3
Eco. 12.....	Marketing .....	3	Fin. 171.....	Readings in Fin...	3
Eco. 60.....	Eco. of Insurance.	3	Fin. 172.....	Readings in Fin...	3
Eco. 107.....	Adv. Economics..	3	I.E. 2.....	Industrial Mgt...	3
Eco. 108.....	Adv. Economics..	3	I.E. 3.....	Industrial Mgt...	3
Eco. 113.....	Advertising .....	3	Law 2.....	Business Law....	3
Eco. 114.....	Sell. & Sales Mgt.	3	Law 102 .....	Business Law....	3
Eco. 133.....	Labor Problems..	3	Law 103 .....	Fed. Tax Law....	3
Eco. 134.....	Labor Problems..	3	Soc. 51.....	Social Institutions.	3
Eco. 171.....	Readings in Eco.	3	Soc. 161.....	Sociology .....	3
Eco. 172.....	Readings in Eco...	3	Soc. 162.....	Sociology .....	3
E.S. 147.....	Stat. Analysis....	3	Soc. 171.....	Readings in Soc....	3
E.S. 148.....	Adv. Bus. Cycles..	3	Soc. 172.....	Readings in Soc...	3

**III. OPTIONAL AND ELECTIVE COURSES (30 Hrs.)**

English or Foreign Language (12 hrs.)      Science (6 hrs.)  
Arts Options (12 hrs.)      Free Electives (12 hrs.)

The Science Options are Biology 7, 8, 11, 13 ; Chemistry 2-12, 20 ; Geology 16, 17, 10, 8 ; Physics 12, 16. The Arts Options are courses in History and Government, Mathematics, Philosophy, and Psychology (not more than 6 hours in one group). For the English or foreign language option, either English or foreign languages or a combination of both may be offered, but not less than six credit hours of a single elementary foreign language may be presented.

A normal schedule for graduation would be as follows:

FIRST SEMESTER			FRESHMAN YEAR		SECOND SEMESTER	
Number	Title	Cr. Hrs.	Number	Title	Cr. Hrs.	
Eco. 1.....	Ind Hist.....	3	Eco. 50.....	Econ. Geography..	3	
Engl. 1.....	English Comp.....	3	Engl. 2.....	English Comp....	3	
Math. 1b.....	Gen. Math.....	3	Math. 40 .....	Math. of Finance.	3	
	Science	3		Science .....	3	
	For. Lang. or Arts}	3		For. Lang. or Arts}	3	
Mil. 1.....	Mil. Science.....	2	Mil. 2.....	Mil. Science.....	2	
P.E. 1.....	Physical Ed.....	—	P.E. 2.....	Physical Ed.....	—	
M.R.P. 10.....	Student Phil....	—				

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FIRST SEMESTER	SOPHOMORE YEAR	SECOND SEMESTER	
Acctg. 1..... Accounting .....	3	Acctg. 2..... Accounting .....	3
Eco. 3..... Economics .....	3	Eco. 4..... Economics .....	3
Engl. or For.....		Engl. or For.....	
Lang. or .....	9	Lang. or .....	9
Arts Option....}		Arts Option....}	
Mil. 3..... Mil. Science.....	2	Mil. 4..... Mil. Science .....	2
P.E. 3..... Physical Ed.....	—	P.E. 4..... Physical Ed.....	—

FIRST SEMESTER	JUNIOR YEAR	SECOND SEMESTER	
E.S. 145..... Statistical Method	3	E.S. 146 ..... Bus. Cycles.....	3
Fin. 21..... Corp. Finance.....	3	Fin. 22..... Corp. Fin.....	3
Eco. 11..... Marketing .....	3	Eco. 33..... Money & Banking .....	3
Adv. Bus. Ad.....		Adv. Bus. Ad.....	
Options or....}	6	Options or....}	6
Free Elective..)		Free Elective..)	
P.E. 5..... Physical Ed.....	—	P.E. 6..... Physical Ed.....	—

FIRST SEMESTER	SENIOR YEAR	SECOND SEMESTER	
Adv. Bus. Ad.....		Adv. Bus. Ad.....	
Options or....}	15	Options or....}	15
Free Elective..)		Free Elective..)	
P.E. 7..... Physical Ed.....	—	P.E. 8..... Physical Ed.....	—

The College of  
Engineering



## THE COLLEGE OF ENGINEERING

### **Administrative Officers**

Alfred Copeland Callen, *Dean of the College of Engineering*

Wray Hollowell Congdon, *Dean of Undergraduates*

George Bartlett Curtis, *Registrar*

Earl Kenneth Smiley, *Director of Admissions*

### **Faculty**

Edward Delbert Amstutz.....	<i>Chemistry and Chemical Engineering</i>
Harold Victor Anderson.....	<i>Chemistry and Chemical Engineering</i>
Jacob Lynford Beaver.....	<i>Electrical Engineering</i>
George Carlton Beck.....	<i>Chemistry and Chemical Engineering</i>
Charles Clarence Bidwell.....	<i>Physics</i>
Robert Dominick Billinger..	<i>Chemistry and Chemical Engineering</i>
Cornelius Godfrey Brennecke.....	<i>Electrical Engineering</i>
Allison Butts.....	<i>Metallurgical Engineering</i>
Alfred Copeland Callen.....	<i>Mining Engineering</i>
Elliott Ward Cheney.....	<i>Physics</i>
Alpha Albert Diefenderfer..	<i>Chemistry and Chemical Engineering</i>
Gilbert Everett Doan.....	<i>Metallurgical Engineering</i>
William Joseph Eney.....	<i>Civil Engineering</i>
James Van Deusen Eppes.....	<i>Mechanical Engineering</i>
Bela Kalman Erdoss .....	<i>Mechanical Engineering</i>
Frederic Philip Fischer.....	<i>Electrical Engineering</i>
Frank Junior Fornoff.....	<i>Chemistry and Chemical Engineering</i>
Walton Forstall, Jr.....	<i>Mechanical Engineering</i>

LEHIGH UNIVERSITY

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John H. Frye, Jr.	<i>Metallurgical Engineering</i>
Merton Otis Fuller	<i>Civil Engineering</i>
Robert Taylor Gallagher	<i>Mining Engineering</i>
Howard Dietrich Gruber	<i>Electrical Engineering</i>
Thomas Huger Hazlehurst	<i>Chemistry and Chemical Engineering</i>
Willis Amos Heisey	<i>Chemistry</i>
Paul Hessemer	<i>Civil Engineering</i>
Arthur Thomas Ippen	<i>Civil Engineering</i>
Thomas Edgar Jackson	<i>Mechanical and Industrial Engineering</i>
Arthur Warner Klein	<i>Mechanical and Industrial Engineering</i>
Robert Hervey Lafferty, Jr.	<i>Chemistry</i>
Fred Viall Larkin	<i>Mechanical and Industrial Engineering</i>
Francis S. McGuiness	<i>Mechanical Engineering</i>
Archie Roscoe Miller	<i>Electrical Engineering</i>
Elias Robins Morgan	<i>Mechanical Engineering</i>
Douglas Ewart Mode	<i>Electrical Engineering</i>
Harvey Alexander Neville	<i>Chemistry and Chemical Engineering</i>
Harry Gordon Payrow	<i>Civil Engineering</i>
Earl James Serfass	<i>Chemistry and Chemical Engineering</i>
Charles Wellington Simmons	<i>Chemistry and Chemical Engineering</i>
Judson Gray Smull	<i>Chemistry and Chemical Engineering</i>
Robert Daniel Stout	<i>Metallurgical Engineering</i>
Milton Caleb Stuart	<i>Mechanical and Industrial Engineering</i>
Hale Sutherland	<i>Civil Engineering</i>
Edwin Raymond Theis	<i>Chemistry and Chemical Engineering</i>
Eugene Henry Uhler	<i>Civil Engineering</i>
Ray Theodore Wendland	<i>Chemistry</i>
Albert Charles Zettlemoyer	<i>Chemistry</i>

## THE COLLEGE OF ENGINEERING

The College of Engineering offers curricula in

Chemical Engineering  
Chemistry  
Civil Engineering  
Electrical Engineering  
Engineering Physics  
Industrial Engineering  
Mechanical Engineering  
Metallurgical Engineering  
Mining Engineering  
Combined Engineering and Arts

### The Curricula

The engineering curricula were formulated on the basis of an intensive study, by the faculty of Lehigh University, of the problems of technical education and the changing needs of modern industry. This study led to the conclusion that greater emphasis than heretofore should be placed upon the fundamentals of engineering, including mathematics, physics, chemistry, and theoretical and applied mechanics, and less emphasis upon the highly specialized details of engineering practice; and that the engineer must know something of the social sciences, that is, the sciences which deal with human relations, and be familiar with the methods of business organization and administration. The various engineering curricula accordingly emphasize the fundamental sciences and those humanistic subjects which are a part of the equipment of every well educated man and which are now recognized as essential to the proper training of engineers because of their practical applications in industrial, business, and civic life.

Advanced courses in military science and tactics are optional with other courses subject to the approval of the director of the curriculum concerned.

Among the noteworthy features of the curricula the following may be mentioned:

(1) Provision is made for a uniform freshman year in the College of Engineering, and the students' definite choices among

the specialized engineering curricula are deferred until the spring of the freshman year, when it is hoped they may be prepared, after a year of college work, and on the basis of guidance in engineering conferences, to choose wisely; students who at registration in the fall already have preferences for one curriculum or another are asked to indicate such preferences, but the indications noted at that time are regarded as merely tentative and do not commit the students in any way.

(2) The work of the first two years is fairly self-contained. To those who for one reason or another are unable to complete their engineering training, it affords preparation for careers as draftsmen, electricians, surveyors, shop foremen, or assistants in industrial laboratories or plants. Students who complete in full the work of the first two years and who then withdraw from the University are given a certificate of work completed.

(3) Near the close of the second year every sophomore is required to take a general engineering aptitude test to determine his ability to apply to engineering problems the principles of chemistry, mathematics, and physics studied during his first two years. Students whose showing in this examination is unsatisfactory and whose work for the first two years has been poor may be compelled to withdraw from the College of Engineering and to change into other curricula better suited to their aptitudes and interests.

(4) Since the University recognizes that an engineer cannot be trained by purely academic process, the degree awarded upon graduation is Bachelor of Science in the particular division of engineering that has been studied, for example, B.S. in Civil Engineering. The successful completion of one year of graduate study leads to the degree of Master of Science in the particular division of engineering studied. Professional degrees are conferred after five years of acceptable experience, as noted below.

#### **Engineering Conferences**

During the sophomore year engineering conferences are conducted in the curriculum of the student's choice. By means of these conferences and by the appraisal made by each curriculum director throughout the sophomore year an estimate of the student's aptitude for further engineering work is attempted.

### The Uniform Freshman Year

An outline follows of the work of the freshman year, uniform for all engineering students. For schedules of the work of the upper three years, varying according to the several specialized curricula see the subsequent pages.

#### FRESHMAN YEAR

FIRST SEMESTER			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 1 or 3	Chemistry	2	Chem. 8	Stoichiometry	1
Chem. 11 or 13	Chemistry Lab.	2	Chem. 20	Qual. Analysis	3
C.E. 1	Engr. Drawing	2	C.E. 2	Engr. Drawing	2
Engl. 1	English	3	Engl. 2	English	3
Math. 11	Alg. & Anal. Geom.	3	Math. 12	Anal. Geom. & Cal.	3
Phys. 22	Mech. & Light.	4	Phys. 20	Mechanics	4
Math. 20	or Mechanics	4	Phys. 22	or Mech. & Lt.)	4
Mil. 21	Military Science	3	Mil. 22	Military Science	3
P.E. 1	Physical Education	—	P.E. 2	Physical Education	—
			M.R.Phil. 10	Student Philosophy	—
					19

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#### Selection of Specialized Curricula

In the second semester of his freshman year each engineering student must announce his selection of the particular engineering curriculum which he desires to continue. This announcement must be made at least one month before the end of the semester named.

#### Inspection Trips

Inspection trips to industrial plants are a required part of specific courses in the various curricula in engineering. Written reports or examinations are required. These trips are under the general direction and supervision of the faculty committee on inspection trips. They are generally held during the senior year and involve an average expense of about \$25.00. The location of the University in the center of industrial activities of various kinds furnishes unusual opportunities for visits of inspection to engineering plants.

#### Combined Arts and Engineering Curricula

Students who can afford the extra time and money are urged to spend five years in their collegiate training and to cover the requirements for the degrees of B.A. and B.S. in engineering. Under the five-year plan a student registers in the College of Arts and Science for four years, earning the B.A. degree on

completion of a program which includes, along with specific B.A. training, the fundamental mathematical, scientific, and engineering subjects of the engineering curriculum of his choice. The fifth year is spent in the College of Engineering, carrying on a program leading to the degree of B.S. in his selected branch of engineering. This is usually the senior year curriculum of the chosen branch of engineering.

An engineering student, who decides at any stage of his course that he wishes to work for both the B.A. and B.S. degrees, may register in one of the colleges concerned for a period of years and complete the combined requirements of both degrees in five or six years, depending upon the program followed before the decision is made. His curriculum is so arranged that the work for one degree may be finished at the end of a four-year period, and the work for the subsequent degree at the close of the fifth or sixth year.

Graduates of liberal arts colleges planning to become candidates for a baccalaureate degree in engineering are referred to page 29.

#### **Professional Engineering Degrees**

Graduates of the various technical curricula of Lehigh University with the degree of Bachelor of Science in Civil Engineering, Mechanical Engineering, Electrical Engineering, Metallurgical Engineering, Mining Engineering, Chemical Engineering, and Industrial Engineering, may be candidates for the corresponding professional degrees, namely, Civil Engineer (C.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Metallurgical Engineer (Met.E.), Mining Engineer (E.M.), Chemical Engineering (Ch.E.), and Industrial Engineer (I.E.). To qualify for a professional degree, a candidate must submit evidence of having had, since graduation, at least five years of acceptable experience in the field of engineering corresponding to the degree desired, and must submit also an acceptable thesis, the subject of which must be approved in advance by the department concerned. In those cases where the degrees applied for does not correspond in subject to the candidate's undergraduate training, evidence must be furnished that any such scholastic deficiency has been satisfied.

Graduates of Lehigh University with the degree of Master of Science in one of the engineering fields may be candidates for

the appropriate professional degrees on the same basis as holders of a baccalaureate degree. A candidate who has had a year of acceptable graduate work at Lehigh or elsewhere may count the graduate year toward the partial satisfaction of the requirement of five years of acceptable experience.

Declaration of candidacy for professional degrees must be made on or before January 1 of the year in which the candidate expects to receive his degree. Application blanks may be obtained from the registrar. The thesis must be submitted in duplicate (one copy for the department and one for the University Library) on or before March 15 and should be sent directly to the department concerned. Formal application for a professional degree, accompanied by the graduation fee of \$10, must be made before May 15 of the year in which the degree is to be conferred. Professional degrees are conferred only in June.

### THE CURRICULUM IN CHEMICAL ENGINEERING

The curriculum in chemical engineering is designed to prepare the student for the profession of chemical engineer, which includes the design, construction, operation, and management of manufacturing establishments in which chemical products are made. Such substances include paper, gasoline and other petroleum products, cement, coke, gas, dyes, electrochemical products, paints, rubber, leather, foods, and other substances. In addition to the primary requirement of chemistry in all its branches, the training of the chemical engineer includes a thorough knowledge of physics and mathematics, and a sound understanding of such fundamentals of chemical, mechanical, and electrical engineering as will make him a discriminating research, operating, or sales engineer.

After chemical investigations furnish a better understanding of known process or develop novel processes or novel methods, it is the particular province of chemical engineering to carry them forward into industrial production. The curriculum is not planned to turn out a specialist restricted to any one type of product; the aim is rather to develop expertness in the sciences and fundamental unit manufacturing processes which underlie all chemical engineering. Some familiarity with factory methods under actual working conditions is acquired through contact with operations in nearby plants. Frequent visits for observation and report are made to manufacturing plants in the immediate neighborhood and in the Philadelphia and New York districts.

Approved elective sequences through the junior and senior years are provided as variants of the regular curriculum. These are:

#### BUSINESS ADMINISTRATION

Fin. 25 .... Corporation Finance	Acctg. 4 .... Accounting
E.S. 145 .... Statistical Method	E.S. 146 .... Bus. Cycles & Fore.

#### MATHEMATICS-PHYSICS

Math. 106 ... Advanced Calculus	Math. 124 ... Theory of Errors
Math. 111 ... Differential Equations or Phys. 160. Mod. Phys. Theories	Math. 112 ... Differential Equations or Phy. 161. Mod. Phys. Theories

#### BIOCHEMISTRY

Biol. 52 .... Bacteriology	Biol. 153 ... Advanced Bacteriology
Biol. 1 .... Biology	Chem. 171 .. Indus. Biochemistry

#### EDUCATION

Educ. 1 .... Intro. to Teaching	Psych. 1 .... Psychology
Educ. 51 .... Prin. of H.S. Teaching	Educ. 20 .... Educ. Psychology

E N G I N E E R I N G

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**THE CURRICULUM IN CHEMICAL ENGINEERING**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.			
Chem. 30	Quant. Analysis	3	Chem. 31	Quant. Analysis	3			
Chem. 41	Quant. Anal. Conf.	1	Chem. 45	Quant. Anal. Conf.	1			
Eco. 3	Economics	3	Eco. 4	Economics	3			
*Ger. 1 or 3	German	3	Ger. 2 or 4	German	3			
Math. 13	Calculus	3	Math. 14	Inter. Calculus	3			
Phys. 24	Elec. & Magnetism	4	Phys. 23	Dynamics & Heat	4			
Mil. 23	Military Science	3	E.C. 4	Engr. Conferences	—			
E.C. 3	Engr. Conferences	—	P.E. 4	Physical Education	—			
P.E. 3	Physical Education	—						
		20						17

\* Students in this curriculum are required to pass Ger. 7 (3). Those who are able to omit one or both semesters of the courses prerequisite to Ger. 7 will elect other courses as substitutes.

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.			
Chem. 6	Inorg. Chemistry	3	Chem. 7	Physical Chem.	3			
Ch.E. 78	Chemical Engr.	3	Ch.E. 79	Chemical Engr.	3			
Chem. 150	Organic Chemistry	3	Chem. 151	Organic Chemistry	3			
Chem. 165	Org. Chem. Lab.	2	Chem. 167	Org. Chem. Lab.	2			
Ger. 7	German	3	Chem. 179	Hist. & Lit. Chem.	1			
	Elective	3	M.E. 29	Heat Engines	3			
P.E. 5	Physical Education	—		Elective	—			
			P.E. 6	Physical Education	—			
		17						18

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.			
Chem. 158	Adv. Org. Chem.	1	Chem. 99	Research Lab.	2			
Chem. 171	or Ind.Biochem.	3	Ch.E. 181	Chemical Engr.	3			
Ch.E. 183	or Unit Processes	1	Ch.E. 185	Chem. Engr. Prac.	1			
Ch.E. 180	Chem. Engr.	3	Chem. 194	Phys. & E'trochm.	3			
Chem. 190	Physical Chem.	3	Chem. 197	Electrochem. Lab.	1			
Chem. 193	Phys. Chem. Lab.	2	C.E. 9	Mech. of Materials	3			
E.E. 58	Electrical Mach.	3	E.E. 59	Dynamo Lab.	1			
M.E. 19	Engineering Lab.	1		Elective	3			
	Elective	3	P.E. 8	Physical Education	—			
P.E. 7	Physical Education	—						
		18						17

### THE CURRICULUM IN CHEMISTRY

The chemist needs a deep insight into the phenomena of matter and into the many processes in which matter undergoes change. The graduate in chemistry may use his education to discover and investigate hitherto unknown combinations of matter and of energy, or he may apply known facts and principles to new and useful purposes in manufacture or in the arts. In preparation for a professional career, the training is thorough in fundamentals and leads to a comprehensive understanding of the scientific and industrial achievements of chemistry.

The curriculum offers an education primarily in chemistry, with considerable training in related sciences and with an adequate grounding in chemical engineering principles. The modern conception of an education in chemistry includes a coordinate study of physics and mathematics. In addition to these so-called physical sciences, other studies, planned to aid and develop the thought-processes and culture of the student, are embodied in the curriculum. It is believed by many practicing chemists and industrial chemists that an undergraduate course such as this one which includes a liberal allotment of study in the humanities is the best preparation for a successful career both in pure science and in the business application of chemistry.

Approved elective sequences adapted to particular objectives are provided as described under chemical engineering above. Other approved sequences may be arranged.

Without reducing the professional training in chemistry, physics, and mathematics, the curriculum can be adapted to include the educational training required for state certification toward teaching these sciences in public high schools.

Since the freshman and sophomore years of this curriculum and of the curriculum in chemical engineering are the same, it is possible for a student to change from one curriculum to the other at the end of either semester of the sophomore year.

Seniors in the curriculum in chemistry may arrange to make the supervised visits to industrial plants required in the curriculum in chemical engineering.

**ENGINEERING**

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**THE CURRICULUM IN CHEMISTRY**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 30	Quant. Analysis	3	Chem. 31	Quant. Analysis	3
Chem. 41	Quant. Anal. Conf.	1	Chem. 45	Quant. Anal. Conf.	1
Eco. 3	Economics	3	Eco. 4	Economics	3
*Ger. 1 or 3	German	3	*Ger. 2 or 4	German	3
Math. 13	Calculus	3	Math. 14	Inter. Calculus	3
Phys. 24	Elec. & Magnetism	4	Phys. 23	Dynamics & Heat.	4
Mil. 23	Military Science	3	E.C. 4	Engr. Conferences	—
E.C. 3	Engr. Conferences	—	P.E. 4	Physical Education	—
P.E. 3	Physical Education	—			
		20			17

\* Students in this curriculum are required to pass Ger. 7 (3). Those who are able to omit one or both semesters of the courses prerequisite to Ger. 7 will elect other courses as substitutes.

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER	
Chem. 6	Inorg. Chemistry	3	Chem. 7	Physical Chem.	3
Chem. 150	Organic Chemistry	3	Ch.E. 80	Ind. & Eng. Chem.	3
Chem. 165	Org. Chem. Lab.	2	Chem. 151	Organic Chemistry	3
	English	3	Chem. 166	Org. Chem. Lab.	3
Ger. 7	German	3	Chem. 179	Hist. & Lit. Chem.	1
	Elective	3		English	3
P.E. 5	Physical Education	—		Elective	3
			P.E. 6	Physical Education	—
		17			19

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
Chem. 158	Adv. Org. Chem.}	3	Chem. 97	Research Lab.	3
Chem. 171	or Ind.Biochem.}	3	Chem. 137	Adv. Anal. Chem..	3
Chem. 190	Physical Chem.	3	Chem. 159	Adv. Org. Chem..	3
Chem. 193	Phys. Chem. Lab.	2	Chem. 194	Phys. & Electrochem.	3
	Electives	9	Chem. 197	Electrochem. Lab.	1
P.E. 7	Physical Education	—		Elective	3
			P.E. 8	Physical Education	—
		17			16

### THE CURRICULUM IN CIVIL ENGINEERING

The purpose of this curriculum is to give instruction in those general and scientific subjects which form the foundation of all engineering, and a special training in the field of civil engineering, which includes the building of highways, railroads, harbors, docks and terminals, bridges, buildings, subways, tunnels, water supply and purification plants, sewage systems and sewage disposal plants, water power developments and surveys. To enable the civil engineering graduate to deal with allied technical problems arising in most civil engineering projects of today, the curriculum includes certain special studies in the fields of mechanical and electrical engineering, geology, and metallurgy. Courses in economics, accounting, and finance have been added since it is essential that the graduate have a knowledge of the fundamentals of business. In preparation for civic responsibility, each student in the senior year studies the basic concepts of our American democracy and of the political philosophies which challenge democracy. In the senior year also there is opportunity for the consideration of these and other topics in the field of the humanities through the medium of elective courses.

The work of the first three years deals chiefly with the scientific and mathematical basis of engineering practice. In the fourth year the application of these basic principles is studied in structural, hydraulic, sanitary, and transportation engineering, the major divisions of the wide field of civil engineering. Sanitary engineering is highly specialized and the student who wishes to practice in this field should elect the sanitary option, which, in addition to the basic material covered in the general option, gives consideration also to those fundamentals of chemistry and bacteriology requisite to knowledge of water purification and of sewage and waste disposal. A program of studies, planned to suit individual needs, known as the administrative option, is available for those students who wish to prepare themselves for the superintendence of construction, the administration of public works, dealing in building material, general contracting, and other work requiring operational organization and economy of management.

The positions open to new graduates include those of inspector, timekeeper, and engineering assistant on construction work, instrument man on surveys, draftsman, computer, and engineering apprentice.

E N G I N E E R I N G

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**THE CURRICULUM IN CIVIL ENGINEERING**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
C.E. 6a . . . .	Land and Top. Sur.	3	C.E. 31a . . . .	Route Surveying . . . .	3
Eco. 3 . . . .	Economics . . . .	3	Eco. 4 . . . .	Economics . . . .	3
Math. 13 . . . .	Calculus . . . .	3	Math. 14 . . . .	Inter. Calculus . . . .	3
Phys. 23 . . . .	Dyn. & Heat . . . .	4	Phys. 24 . . . .	Elec. & Magnetism . . . .	4
Mil. 23 . . . .	Military Science . . . .	3	General Option		
General Option			Geol. 9 . . . .	Engr. Geology . . . .	3
Geol. 10 . . . .	Prin. of Geology.3	3	or Sanitary Option		
or Sanitary Option			Biol. 50 . . . .	San. Bact. . . .	3
Chem. 30 . . . .	Quant. Analysis 3	3	E.C. 4 . . . .	Engr. Conferences . . . .	—
Chem. 41 . . . .	Quant. An. Conf.1	4	P.E. 4 . . . .	Physical Education . . . .	—
E.C. 3 . . . .	Engr. Conferences . . . .	—			
P.E. 3 . . . .	Physical Education . . . .	—			
		19 or 20			16

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
C.E. 8 . . . .	Mech. of Materials . . . .	4	*Acctg. 4 . . . .	Accounting . . . .	3
C.E. 10 . . . .	Mat. Testing Lab..	1	C.E. 12 . . . .	Hydraulics . . . .	3
*Fin. 25 . . . .	Corp. Finance . . . .	3	C.E. 14 . . . .	Hydraulics Lab. . . .	1
M.E. 29 . . . .	Heat Engines . . . .	3	C.E. 19 . . . .	Adv. Mech. of Mat. . . .	3
General Option			Met. 21 . . . .	Engr. Met. . . .	2
C.E. 16 . . . .	Highway Engr. . . .	3	General Option		
E.E. 50 . . . .	Dyn. & Motors.2	2	C.E. 15 . . . .	Stresses . . . .	4
E.E. 51 . . . .	Dynamo Lab. . . .	1	E.E. 52 . . . .	Alt. Currents . . . .	2
or Sanitary Option			E.E. 53 . . . .	Dynamo Lab. . . .	1
Chem. 150 . . . .	Organic Chem. . . .	3	or Sanitary Option		
E.E. 58 . . . .	Electrical March.3	7	C.E. 15a . . . .	Stresses . . . .	2
E.E. 59 . . . .	Dyn. Lab. Comb.1	1	Chem. 151 . . . .	Organic Chem. . . .	3
P.E. 5 . . . .	Physical Education . . . .	—	P.E. 6 . . . .	Physical Education . . . .	—
		17 or 18			19 or 18

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
C.E. 118 . . . .	Structural Theory. . . .	3	C.E. 101 . . . .	Foundations . . . .	2
C.E. 125 . . . .	Reinf. Conc. Design . . . .	3	C.E. 126 . . . .	Concrete Lab. . . .	1
C.E. 128 . . . .	Sanitary Engr. . . .	3	C.E. 129 . . . .	San. Eng. Des. . . .	3
General Option			General Option		
C.E. 35 . . . .	Adv. Surveying.3	3	C.E. 11 . . . .	Railroad Eng. . . .	3
C.E. 119 . . . .	Struc. Design . . . .	3	C.E. 120 . . . .	Struc. Design . . . .	2
*Govt. 163 . . . .	Cont. Pol. Tho't.3	3	C.E. 41a . . . .	C.E. Proseminar.1	1
or Sanitary Option			C.E. Elective (C.E. 100 or 124 or 131 or 132 or 50) . . . .		12
C.E. 119a . . . .	Struc. Design . . . .	1	*Govt. 164 . . . .	Cont. Pol. Tho't.3	11
C.E. 16a . . . .	Highway Engr. . . .	2	or Sanitary Option		
Geol. 10 . . . .	Princ. of Geol..3	3	C.E. 120a . . . .	Struc. Design . . . .	1
*Govt. 157 . . . .	Municipal Govt.3	3	C.E. 41a . . . .	C.E. Proseminar.1	1
P.E. 7 . . . .	Physical Education . . . .	—	C.E. 131 . . . .	Adv. San. Engr.3	3
			Geol. 9 . . . .	Engr. Geology . . . .	3
			*Govt. 158 . . . .	Municipal Adm.3	3
			C.E. 40 . . . .	Engr. Conference . . . .	—
			P.E. 8 . . . .	Physical Education . . . .	—
		18			18 or 17

**ADMINISTRATIVE OPTION:** In the sophomore, junior, and senior years there is opportunity for a program of twelve credit hours in subjects pertaining to business, industrial management, and social organization, obtained by substitution of an approved program for certain of the work in the general option.

\* By permission of the director of the curriculum, a non-technical elective may be taken in place of this course.

### THE CURRICULUM IN ELECTRICAL ENGINEERING

The electrical engineer is one who practices the science and art of economically "directing the sources of electrical power in nature for the uses and conveniences of man." He may design, manufacture, install, or operate electrical machinery and equipment, manage plants and electric systems, or engage in the promotion of engineering projects.

The object of this curriculum is to give instruction in those general and scientific subjects which underlies all the branches of engineering, and to give special training in those technical and business subjects which experience shows are most essential in the equipment of the electrical engineer. In seeking to accomplish this object the department puts chief emphasis upon mastery of the mathematical-physical principles and thoroughness in the analysis of problems.

The curriculum provides a balanced allotment of time in each of four principal divisions: (1) mathematics and the basic sciences, (2) electrical engineering, (3) allied branches of engineering, and (4) non-technical subjects in arts and business. In order to make maximum use of the available time, the electrical courses are highly coordinated with respect to classroom and laboratory work; concurrent courses are designed to augment and supplement each other; and consecutive courses to extend and build upon the previous courses.

In recognition of different talents and inclinations among individuals, and of specialization in industry, three separate options are offered in the Senior year: (1) the "Power Option" for those interested in the technical aspects of design, operation, and development of electrical machinery and power systems; (2) the "Communication Option" for those interested in the technical aspects of wire or radio communications; and, (3) the "General Option" for those less interested in technical applications and more inclined towards commercial, managerial and executive assignments. The work of the first three years and some of that in the senior year is identical for each option; so that all graduates will have had the same basic work. Thus, although a student elects a particular option, he has a foundation sufficiently fundamental to enable him to enter any branch of electrical engineering.

E N G I N E E R I N G

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**THE CURRICULUM IN ELECTRICAL ENGINEERING**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Met. 21	Metallurgy	2	E.E. 32a	Direct Cur. Mach.	3
Met. 81	Met. Problems	1	E.E. 33a	D. C. Lab.	1
Phys. 24	Elec. & Magnetism	4	Phys. 23	Dynamics & Heat	4
Math. 13	Calculus	3	Math. 14	Inter. Calculus	3
Eco. 3	Economics	3	Eco. 4	Economics	3
Mil. 23	Military Science	3		Elective	2
Speech 30	Fund. of Speech	3	E.C. 4	Engr. Conferences	—
E.C. 3	Engr. Conferences	—	P.E. 4	Physical Education	—
P.E. 3	Physical Education	—			
		19			16

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER	
Number	Title	Number	Title	Number	Title
E.E. 34	A.C. Circuits	3	E.E. 36	A.C. Machines	3
E.E. 35	A.C. Circuits Lab.	1	E.E. 37	A.C. Mach. Lab.	2
Math. 106	Adv. Calculus	3	E.E. 40	Electronics	3
C.E. 9	Mech. of Materials	3	C.E. 13	Hydraulics	2
C.E. 10	Mat. Testing Lab.	1	C.E. 14	Hydraulics Lab.	1
M.E. 22	Heat Engines	3	M.E. 23	Heat Engines	3
Phys. 110	Adv. Elec. Lab.	1	Phys. 111	Adv. Elec. Lab.	1
	*General Study	3		*General Study	3
P.E. 5	Physical Education	—	P.E. 6	Physical Education	—
		18			18

\* See Register, bottom of page 97.

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
Number	Title	Number	Title	Number	Title
M.E. 21	Engineering Lab.	1	M.E. 25	Engineering Lab.	1
E.E. 38	A.C. Machines	3	E.E. 118	Proseminar	1
E.E. 39	A.C. Machine Lab.	2		Arts or Bus. Elec.	3
E.E. 117	Proseminar	1			

POWER OPTION					
E.E. 131	Elec. & Mag. Fields	3	E.E. 132	Electric Transients	3
E.E. 133	Transmission Lines	3	E.E. 134	Trans. Line Trans.	3
E.E. 135	Symmetrical Comp.	3	E.E. 136	System Stability	2
Math. 121	Analytic Mech.	3	E.E. 137	Adv. Mach. Theory	3
			E.E. 138	Transients Lab.	1

COMMUNICATION OPTION					
E.E. 131	Elec. & Mag. Fields	3	E.E. 132	Electric Transients	3
E.E. 141	Radio Commun.	3	E.E. 142	Radio Commun.	2
E.E. 143	Wire Commun.	3	E.E. 144	Wire Commun.	3
Math. 121	Analytic Mech.	3	E.E. 146	Ultra High Freq.	4

GENERAL OPTION					
E.E. 101	Electric Power Sta.	3	E.E. 102	Distr. Systems	3
E.E. 103	Industrial App.	3	E.E. 106	Illumination Engr.	3
I.E. 2	Ind. Management	3	I.E. 3	Ind. Management	3
	Business Elective	3	Acctg. 4	Accounting	3

19 17

### THE CURRICULUM IN ENGINEERING PHYSICS

The curriculum in engineering physics has been developed over a number of years to meet a demand on the part of industry and government for men trained in the fundamentals and technique of scientific research.

Industrial expansion, development and even the establishment of entirely new industries have repeatedly followed upon research. The widespread recognition of this fact in recent years has led to the organization of laboratories of research in nearly every industry great and small, with a consequent demand for suitably trained men.

The amazing expansion in the electrical industries is almost wholly the result of organized research. This statement applies more or less to every major industry. The products of research include the incandescent lamp, the x-ray tube, telephone, radio, automobile, airplane, talking movies, optical glass, etc.

While the training in this curriculum is intended to be in fundamentals primarily, it is still consciously practical. While it is practical it is not permitted to lose sight of the fact that today's theory may yield tomorrow's practice.

Graduates from this curriculum find places in government laboratories and in the laboratories of the electrical, communication, automotive, and other industries. Some students continue their studies in the academic field, pursuing research as members of the staff of a college or university.

The curriculum includes a liberal number of electives, wherein each student may develop his best talents by particular attention to topics of special interest. Such topics constitute a liaison with particular branches of technology, among which may be mentioned electro-acoustics, telephone engineering, geophysical practice, etc. Each student is urged to cultivate some such special interest but only to that moderate degree which still permits him to lay a thoroughly adequate basis of fundamentals.

E N G I N E E R I N G

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**THE CURRICULUM IN ENGINEERING PHYSICS**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Eco. 3	Economics	3	Eco. 4	Economics	3
Ger. 1 or 3	German	3	Ger. 2 or 4	German	3
Math. 13	Calculus	3	Math. 14	Inter. Calculus	3
Phys. 23	Dynamics & Heat	4	Phys. 24	Elec. & Magnetism	4
Chem. 6	Inorg. Chemistry } 3		Chem. 7	In. & Phys. Chem. } 3	
Geol. 1	or Mineralogy }		Geol. 10	or Geology }	
Mil. 23	Military Science	3	E.C. 4	Engr. Conferences	—
E.C. 3	Engr. Conferences	—	P.E. 4	Physical Education	—
P.E. 3	Physical Education	—			
		19			16

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER	
Number	Title	Number	Title	Number	Title
Math. 106	Adv. Calculus	3	Math. 121	Anal. Mechanics	3
Phys. 110	Adv. Elec. Lab.	1	Phys. 111	Adv. Elec. Lab.	1
Phys. 122	Physical Optics	3	Phys. 126	Pyrometry	3
Phys. 162	Th. Elec. & Mag.	3	Phys. 163	Th. Elec. & Mag.	3
E.E. 50	Dyn. & Motors. 2		E.E. 52	Alt. Currents. 2	
E.E. 51	& Dyn. Lab. 1	3	E.E. 53	& Dyn. Lab. 1	3
M.E. 22	or Heat Eng.		M.E. 23	or Heat Eng.	
Ger. 3	German	3	Ger. 4	German	3
Fr. 1	or French		Fr. 2	or French	
	Elective	3		Elective	3
P.E. 5	Physical Education	—	P.E. 6	Physical Education	—
		19			19

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
Number	Title	Number	Title	Number	Title
Phys. 124	El. Dis. in Gases	3	Phys. 120	Electric Waves	3
Phys. 160	Mod. Theories	3	Phys. 161	Mod. Theories	3
Phys. 164	Advanced Lab.	2	Phys. 165	Advanced Lab.	2
C.E. 9	Mech. of Mat.		Chem. 194	Phys. Chem. 3	
Chem. 190	or Ph. Chem. 3		Chem. 197	& Electrochem.	
Chem. 193	& Lab. 2			Lab. 1	
Geol. 111	or Field Geol. 2		E.E. 132	or El. Trans. 3	
Geol. 114	& Str. Geol. 3	3	Geol. 110	or Stratig'y. 2	3
Math. 111	or Adv. Dif. Eq. 3		Math. 112	or Adv. Dif. Eq. 3	
Met. 21	or Engr. Met. 2		Math. 124	or Theo. of Er. 3	
Met. 81	& Met. Prob. 1		Met. 21	or Engr. Met. 2	
	Electives	6	Met. 81	& Met. Prob. 1	
P.E. 7	Physical Education	—		Electives	6
			P.E. 8	Physical Education	—
		17			17

### THE CURRICULUM IN INDUSTRIAL ENGINEERING

Industrial engineering has to do with the organization, operation, and management of manufacturing plants, public utilities, and operating, holding, and management companies. Broadly considered, it covers the engineering aspects of plant location, plant layout, routing, production control, maintenance, stores, and inspection; the economic aspects of employment, employee training, promotion, wage payment, bonus, safety and welfare, insurance, and old age pensions; and the commercial aspects of purchasing, marketing, credit, accounting, and finance.

Industrial enterprises depend on sound financing, adequate accounting, and intelligent forecasting of economic developments. Technical skill and engineering efficiency are primary requisites, but these alone are not sufficient. There is a demand by industry for men who have had not only a thorough training in the fundamentals of engineering, but also a knowledge of the problems of accounting, finance, statistics, and management which every enterprise encounters. The object of the curriculum in industrial engineering is to add a knowledge of the basic facts of economics, finance, and management to the technical knowledge and scientific spirit that come from the study of engineering.

The curriculum in industrial engineering is primarily an engineering curriculum supplemented by courses in economics and business administration, so chosen as to provide a thorough training in the fundamental principles of economics, industrial management, corporation financing, and business practice. The curriculum is designed primarily to meet the needs of that considerable body of students who intend to enter industries essentially technical, whether public utilities or manufacturing plants, but who intend to go into the administrative departments.

E N G I N E E R I N G

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**THE CURRICULUM IN INDUSTRIAL ENGINEERING**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Eco. 3	Economics .....	3	Eco. 4	Economics .....	3	C.E. 32	Mech. of Materials	3
Math. 13	Calculus .....	3	Math. 14	Inter. Calculus ..	3	E.E. 52	Alt. Currents ....	2
M.E. 1	Elem. Mch. Design	3	M.E. 4	Elem. Mch. Design	3	E.E. 53	Dynamo Lab. ....	1
M.E. 2	El. Heat Engines.	3	M.E. 5	Heat Engines .....	3	I.E. 13	Industrial Engr. ....	3
Phys. 23	Dynamics & Heat.	4	Phys. 24	Elec. & Magnetism	4	M.E. 19	Engr. Lab. ....	1
Mil. 23	Military Science...	3	E.C. 4	Engr. Conferences.	—	M.E. 33	Thermodynamics .....	2
E.C. 3	Engr. Conferences.	—	P.E. 4	Physical Education	—	Psych. 15	Industrial Psych. ....	3
P.E. 3	Physical Education —	—				P.E. 6	Arts Elective ....	3
		19						16

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Acctg. 4	Accounting .....	3	C.E. 32	Mech. of Materials	3	E.S. 146	Business Cycles ..	3
Fin. 25	Corp. Finance ...	3	E.E. 52	Alt. Currents ....	2	Law 102	Business Law ....	3
E.E. 50	Dyn. & Motors ...	2	E.E. 53	Dynamo Lab. ....	1	Min. 15	Mining Engr. ....	3
E.E. 51	Dynamo Lab. ....	1	I.E. 13	Industrial Engr. ....	3	I.E. 112	Personnel Adm. ....	3
Met. 21	Metallurgy .....	2	M.E. 19	Engr. Lab. ....	1	M.E. 33	Thermodynamics .....	2
Met. 81	Met. Problems ...	1	Psych. 15	Industrial Psych. ....	3	Psych. 15	Industrial Psych. ....	3
Psych. 1	Psychology .....	3	P.E. 6	Physical Education	—			
	Arts Elective ....	3						
P.E. 5	Physical Education —	—						18

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
E.S. 145	Stat. Method .....	3	E.S. 146	Business Cycles ..	3	Law 102	Business Law ....	3
Acctg. 115	Cost Accounting ..	3	Law 102	Business Law ....	3	Min. 15	Mining Engr. ....	3
I.E. 111	Industrial Adm....	3	Min. 15	Mining Engr. ....	3	I.E. 112	Personnel Adm. ....	3
M.E. 40	Machine Design ..	3	I.E. 112	Personnel Adm. ....	3	M.E. 33	Thermodynamics .....	2
	Business Elective..	3						
	Elective .....	3						
P.E. 7	Physical Education —	—						
								18

### THE CURRICULUM IN MECHANICAL ENGINEERING

Mechanical engineering deals with the design, construction, installation, and operation of machinery necessary for the economical and advantageous use of power, and with the management of industries and organizations manufacturing and using power-driven equipment. The high degree of technical skill and efficiency essential to the work of research, design, construction, and operation, which underlies mechanical engineering practice, necessarily prescribes a training based on the fundamental sciences of chemistry, physics, and mathematics.

Aptitude and skill in the interpretation and application of the basic technical sciences are, however, not sufficient. In addition the engineer must acquire an understanding of the influences of his profession on social institutions and traditions. To this end the curriculum requires the student to register for courses in the College of Arts and Science or the College of Business Administration or both, during each of the four years. Specialization in particular fields of mechanical engineering is not undertaken. Class room courses are supplemented with laboratory exercises which are designed to give the student a maximum of freedom in demonstration.

The curriculum is broad, highly technical, and designed to meet the needs of young men interested in the scientific aspects of industry. Emphasis is placed on the fundamental principles underlying the numerous fields of mechanical engineering, including aerodynamics, aeronautics, air conditioning, automotive engineering, and Diesel engines. The young graduate ordinarily enters a graduate apprenticeship in a public utility, manufacturing, or operating organization where opportunity is provided for his development in research, design, operation, sales, or administration, depending upon his interests and aptitudes and the opportunities available.

E N G I N E E R I N G

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**THE CURRICULUM IN MECHANICAL ENGINEERING**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Eco. 3	Economics .....	3	Eco. 4	Economics .....	3
Math. 13	Calculus .....	3	Math. 14	Inter. Calculus ..	3
M.E. 1	Elem. Mch. Design	3	M.E. 4	Elem. Mch. Design	3
M.E. 2	El. Heat Engines	3	M.E. 5	Heat Engines .....	3
Phys. 23	Dynamics & Heat	4	Phys. 24	Elec. & Magnetism	4
Mil. 23	Military Science...	3	E.C. 4	Engr. Conferences.	—
E.C. 3	Engr. Conferences	—	P.E. 4	Physical Education	—
P.E. 3	Physical Education	—			
		19			16

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER		
Number	Title	Number	Title	Number	Title	
C.E. 32	Mech. of Materials	3	E.E. 50	Dyn. & Motors	2	
Fin. 25	Corp. Finance	3	E.E. 51	Dynamo Lab.	1	
I.E. 13	Industrial Engr.	3	Math. 121	Anal. Mechanics		
Math. 106	Adv. Calculus	3	or Math. 126	Adv. Math	3	
or Math. 125	or Adv. Math	3	M.E. 11	Engineering Lab.	1	
M.E. 9	Engineering Lab.	1	M.E. 35	Int. Comb. Engines	2	
M.E. 33	Thermodynamics	2	M.E. 40	Machine Design	3	
	Arts Elective	3	Met. 21	Metallurgy	2	
P.E. 5	Physical Education	—	Met. 81	Met. Problems	1	
					Arts Elective	3
			P.E. 6	Physical Education	—	
		18			18	

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
Number	Title	Number	Title	Number	Title
C.E. 33	Hydraulics .....	3	Acctg. 4	Accounting .....	3
B.E. 52	Alt. Currents	2		Engr. Elective	3
E.E. 53	Dynamo Lab.	1	M.E.†	Adv. Mech. Engr..	3
M.E. 114	Engineering Lab.	2	M.E. 118	Engineering Lab..	2
M.E.*	Adv. Mech. Engr.	3		Adv. Engr. Elec..	3
M.E. 121	Adv. Mach. Design	3	Met. 34	Metallurgy Lab..	1
Met. 33	Metallurgy Lab.	1		Elective .....	3
	Elective .....	3	P.E. 8	Physical Education	—
P.E. 7	Physical Education	—			
		18			18

\* M.E. 100, 116, 117, or 119.

† M.E. 120, 122, 123, or 125.

### THE CURRICULUM IN METALLURGICAL ENGINEERING

Metallurgical Engineering formerly signified the production and refining of metals for industrial and military use. More recently the applications of science to alloying, rolling and forging, heat treatment, machining, and welding, the later stages in the manufacturing processes, have widened the field. A sound general education, coupled with thorough grounding in basic science and general engineering, remain, however, the wisest preparation for the specialist in any of these fields.

Outside of the basic studies in science, general engineering, and metallurgy required of all for the degree, flexibility is provided in the curriculum to permit its adaptation to the individual abilities, prospects, and plans of the student by limited "Electives" and "Professional Subjects." Thus, outside of the essential basic subjects, he may develop in the direction of research with advanced courses in chemistry, physics, mathematics, German, and research; toward plant operation with electives such as labor problems, psychology, and industrial management; or toward the business side of metallurgy with courses such as advanced economics, sociology, and accounting—all without jeopardizing the soundness and adequacy of his basic engineering education.

The hours called "General Study" are for the purpose of providing the student with some mature understanding of the social and human aspects of the world in which he will make his way as an engineer. Typical "General Study" Options are listed opposite. The student's choices of elective courses will be approved, of course, only after individual consultation with the curriculum director.

Electives may also be used in preparation for electrometallurgy, which includes four subjects in the department of electrical engineering and an additional course in electrometallurgy instead of one of the courses in iron and steel.

## ENGINEERING

## THE CURRICULUM IN METALLURGICAL ENGINEERING

FRESHMAN YEAR

See page 79

FIRST SEMESTER		SOPHOMORE YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 36	Quant. Analysis	2	Eco. 4	Economics	3
Chem. 48	Quant. Anal. Conf.	1	Math. 14	Inter. Calculus	3
Eco. 3	Economics	3	Met. 8	Intro. to Met.	2
Math. 13	Calculus	3	Phys. 23	Dynamics & Heat.	4
Met. 7	Intro. to Met.	2		*General Study	3
Phys. 24	Elec. & Magnetism	4	E.C. 4	Engr. Conferences	—
Mil. 23	Military Science	3	P.E. 4	Physical Education	—
E.C. 3	Engr. Conferences	—			
P.E. 3	Physical Education	—			

FIRST SEMESTER	JUNIOR YEAR	SECOND SEMESTER
C.E. 9 . . . . . Mech. of Materials	3	Chem. 7 . . . . . Inorg. & Phys.
C.E. 10 . . . . . Mat. Testing Lab.	1	Chem. . . . .
Engl. 3a . . . . . Types of World Lit.	3	Geol. 10 . . . . . Prin. of Geology.
Geo. 2 . . . . . Mineralogy	2	Met. 52 . . . . . Met. of Iron & Steel
Met. 125 . . . . . Electrochemistry	2	Met. 62 . . . . . Met. Problems
Met. 130 . . . . . Phys. Metallurgy	3	Met. 131 . . . . . Metallography
Met. 135 . . . . . Elec. Chem. Lab.	1	*General Study . . . . .
*General Study . . . . .	3	**Elective . . . . .
P.E. 5 . . . . . Physical Education	—	P.E. 6 . . . . . Physical Education

FIRST SEMESTER	SENIOR YEAR	SECOND SEMESTER
Chem. 190 . . . Phys. Chemistry . . . 3	M.E. 29 . . . Heat Engines . . . 3	
E.E. 58 . . . Elec. Machinery . . . 3	Met. 54 . . . Met. of Zinc, . . .	2
E.E. 59 . . . Dynamo Lab. . . . . 1		Aluminum, etc. . . . .
Met. 53 . . . Met. of Copper, Lead, etc. . . . . 3	Met. 140 . . . Met. Colloquium . . . 1	
Met. 139 . . . Met. Colloquium . . . 1	Met. 152 . . . Adv. Met. I. & S. . . 3	
Met. 163 . . . Met. Problems . . . 1	Met. 164 . . . Met. Problems . . . 1	
†Professional Subjs. . . . . 3		†Professional Subjs. . . . . 6
Elective . . . . . 3		Elective . . . . . 3
P.E. 7 . . . . . Physical Education —	P.E. 8 . . . . . Physical Education	

\* Suggested General Study Options (others may be chosen, all must be approved).

1. History of Civilization.  
Hist. 13 and 14. U. S. History, or Govt. 1, Foundations of Government,  
Govt. 163 and 164, Cont. Political Thought.
2. History of Science and Thought.  
Phil. 3, Introduction to Philosophy, or Gk. 99, Ancient Science, or  
Phil. 14, Logic and the Scientific Method.
3. Literature and the Fine Arts.  
Engl. 3b, Types of World Lit., or Engl. 121 and 122, Cont. Lit., or  
Fine Arts 11 and 12, Ancient and Medieval Art and Art of the  
Italian Renaissance.
4. Social Science.  
Soc. 161 and 162, Sociology, or Eco. 107 and 108, Advanced Economics,  
or Eco. 133 and 134, Labor Problems.

5. Science.  
 Biol. 13, Human Biology, or Psych. 1, Introduction to Psychology, or  
 Astr. 1, Descriptive Astronomy.  
 \* Must be chosen with written approval of curriculum director.  
 \* In preparation for electrometallurgy, E.E. 50 and 51 are elected here  
 and in senior year E.E. 40, 52 and 53, 54 and 55, and Met. 108; E.E. 58  
 and 59 are omitted and Met. 152 is not required.

### THE CURRICULUM IN MINING ENGINEERING

Mining engineering concerns itself with the search for, extraction from the ground, and the initial preparation of the minerals and rocks that are needed to meet the demands of our modern civilization. So basic is the mining industry, so dependent on it are all individuals and industries, that ours has been called a "mineral civilization". Three great classes of materials are provided by the mining engineer: mineral fuels, including coal, petroleum and natural gas; ores of the metals; non-metallics, such as slate, limestone, gypsum, sand and gravel, and scores of others.

All the operations at the mine are within the responsibility of the mining engineer. The actual work of extraction may be only one of his activities, for he may also have to deal with exploration, plant construction, transportation, preparation and processing, and all phases of mine administration. Modern mining has become, in many cases, a mass-production industry. The mechanization of mines has gone forward with startling rapidity. Electrical applications are found in every phase of the industry. The need for engineering training was never more important.

The curriculum in mining engineering includes the basic science common to all branches of engineering—mathematics, physics, chemistry and mechanics. The study of geology is begun in the sophomore year. During the last two years a thorough and progressive training is given in the principles of mining and the methods used in extraction. Special attention is directed to the mechanization of mine operations; to mine ventilation, transportation, economics and administration; and to coal preparation and ore dressing. Technical courses in civil, electrical and mechanical engineering form a part of this advanced work.

Interwoven with the technical program is a series of required courses and electives which offers great flexibility in caring for the needs of the individual student. Wise planning permits, without sacrifice of technical strength, a basic program in business administration consisting of such courses as labor problems, cost accounting, statistical method, money and banking, and corporation finance. Another, desiring to specialize in geology, finds ample opportunity to build a strong program in this field, including geophysics. On the other hand the student who wishes more work in technology can have it, or if he prefers additional courses in general subjects his desires can be met.

E N G I N E E R I N G

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**THE CURRICULUM IN MINING ENGINEERING**

**FRESHMAN YEAR**

See page 79

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.			
Chem. 36	Quant. Analysis	2	Eco. 4	Economics	3			
Chem. 48	Quant. Anal. Conf.	1	Geol. 10	Princ. of Geology	3			
Eco. 3	Economics	3	Math. 14	Inter. Calculus	3			
C.E. 6a	Land Surveying	3	Min. 6	Mine Surveying	3			
Math. 13	Calculus	3	Phys. 24	Elec. & Magnetism	4			
Phys. 23	Dynamics and Heat	4	E.C. 4	Engr. Conferences	—			
Mil. 23	Military Science	3	P.E. 4	Physical Education	—			
E.C. 3	Engr. Conferences	—						
P.E. 3	Physical Education	—						
		19						16

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
C.E. 9	Mech. of Materials	3	Acctg. 4	Accounting	3			
C.E. 10	Mat. Testing Lab.	1	C.E. 13	Hydraulics	2			
Geol. 1	Mineralogy	3	C.E. 14	Hydraulics Lab.	1			
	*General Study	3	Geol. 8	Historical Geol.	3			
M.E. 29	Heat Engines	3		*General Study	3			
Met. 21	Metallurgy	2	Geol. 5	Petrology	3			
Met. 81	Met. Problems	1	Min. 22	Mining Methods	3			
Min. 21	Min. Fundamentals	3	P.E. 6	Physical Education	—			
P.E. 5	Physical Education	—						
		19						18

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
E.E. 50	Dyn. & Motors	2	C.E. 30	Struct. Design	3			
E.E. 51	Dynamo Lab.	1	E.E. 52	Alt. Currents	2			
Min. 103	Mine Ventilation	3	E.E. 53	Dynamo Lab.	1			
Min. 105	Mine Administra.	2	Min. 104	Haulage, Hoisting & Pumping	3			
Min. 107	Ore Dressing & Coal Prep.	3	Min. 106	Mining Economics	3			
	Approved Elective	6	Engl. 42	Technical Writing	3			
P.E. 7	Physical Education	—		Approved Elective	3			
			P.E. 8	Physical Education	—			
		17						18

\* Chosen from the following fields: History of Civilization; History of Science and Thought; Literature and the Fine Arts; Social Sciences; Science. See footnote at bottom of page 97 for suggested courses.



# The Graduate School



## THE GRADUATE SCHOOL

### Administrative Officers

Tomlinson Fort, *Dean of the Graduate School*

George Bartlett Curtis, *Registrar*

Earl Kenneth Smiley, *Director of Admissions*

Robert Pattison More, *Executive Secretary of the  
Graduate Faculty*

### Faculty

Carl Elmer Allen.....	<i>Accounting</i>
Edward Delbert Amstutz.....	<i>Chemistry</i>
Harold Victor Anderson.....	<i>Chemistry</i>
Allen Jennings Barthold.....	<i>Romance Languages</i>
Claude Gillette Beardslee.....	<i>Moral and Religious Philosophy</i>
Jacob Lynford Beaver.....	<i>Electrical Engineering</i>
Frank Chester Becker.....	<i>Philosophy</i>
Charles Clarence Bidwell.....	<i>Physics</i>
Robert Dominick Billinger.....	<i>Chemistry</i>
Frederick Alden Bradford.....	<i>Finance</i>
Cornelius Godfrey Brennecke.....	<i>Electrical Engineering</i>
Allison Butts.....	<i>Metallurgy</i>
Alfred Copeland Callen.....	<i>Mining Engineering</i>
Neil Carothers .....	<i>Economics</i>
Elliot Ward Cheney.....	<i>Physics</i>
James Lowry Clifford.....	<i>English</i>
Wray Hollowell Congdon.....	<i>Education</i>
Roy Burford Cowin.....	<i>Accounting</i>
Herbert Maynard Diamond.....	<i>Economics and Sociology</i>
Alpha Albert Diefenderfer.....	<i>Chemistry</i>
Gilbert Everett Doan.....	<i>Metallurgy</i>
William Joseph Eney.....	<i>Civil Engineering</i>
Tomlinson Fort.....	<i>Mathematics and Astronomy</i>

LEHIGH UNIVERSITY

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Merton Otis Fuller.....	<i>Civil Engineering</i>
Lawrence Henry Gipson.....	<i>History and Government</i>
James Larmour Graham.....	<i>Psychology</i>
George Dewey Harmon.....	<i>History</i>
Thomas Huger Hazlehurst.....	<i>Chemistry</i>
Arthur Warner Klein.....	<i>Mechanical Engineering</i>
Kenneth Worcester Lamson.....	<i>Mathematics</i>
Fred Viall Larkin.....	<i>Mechanical and Industrial Engineering</i>
Archie Roscoe Miller.....	<i>Electrical Engineering</i>
Robert Pattison More.....	<i>German</i>
Harvey Alexander Neville.....	<i>Chemistry</i>
Philip Mason Palmer.....	<i>German</i>
Harry Gordon Payrow.....	<i>Civil Engineering</i>
George Emil Raynor.....	<i>Mathematics</i>
Joseph Benson Reynolds.....	<i>Mathematics</i>
Edgar Heisler Riley.....	<i>English</i>
Ernst Bernhard Schulz.....	<i>Government</i>
Earl James Serfoss .....	<i>Chemistry</i>
Jonathan Burke Severs.....	<i>English</i>
Clarence Albert Shook.....	<i>Mathematics</i>
Charles Wellington Simmons.....	<i>Chemical Engineering</i>
Robert Metcalf Smith.....	<i>English</i>
Duncan Stewart, Jr.....	<i>Geology</i>
Milton Caleb Stuart.....	<i>Mechanical Engineering</i>
Hale Sutherland .....	<i>Civil Engineering</i>
Edwin Raymond Theis.....	<i>Chemical Engineering</i>
Stanley Judson Thomas.....	<i>Biology</i>
Francis John Trembley.....	<i>Biology</i>
Lawrence Whitcomb.....	<i>Geology</i>
Bradford Willard .....	<i>Geology</i>

**Executive Committee of the Graduate Faculty**

Dean Fort, *Chairman*; Professor More, *Executive Secretary*; Professors Doan, Willard, Smith, Barthold, and Beaver.

## THE GRADUATE SCHOOL

Opportunity for graduate study was contemplated at Lehigh from its beginning and was announced in its first Register in 1866. More definite organization of the work along lines that are now generally accepted dates from 1883. Since that time the degrees of Master of Arts and Master of Science have been offered without interruption. The degree of Doctor of Philosophy was also announced for a time and twice conferred. In the middle nineties this degree was withdrawn and doctoral work was not again offered until 1936, when it was once more authorized by the trustees. In this same year the Graduate School was organized, with a graduate faculty which has full power to enact the necessary legislation governing the work of the School. The faculty is composed of the president of the University and all professors and associate professors who give work for graduate credit. The rules and regulations of the faculty are administered by an executive committee composed of the president of the University, the dean of the Graduate School, the executive secretary of the graduate school faculty, and five elected members of the graduate faculty.

At present, Lehigh University offers to qualified students in various branches of literature, science, and technology advanced instruction leading to the degrees of Master of Arts and Master of Science and, in a more limited number of fields, work leading to the degree of Doctor of Philosophy.

Major work leading to the master's degree may be taken in the following fields: bacteriology, biology, chemical engineering, chemistry, civil engineering, education, electrical engineering, English, French, geology, Greek, history and government, industrial engineering, Latin, mathematics, mechanical engineering, metallurgical engineering, mining engineering, philosophy, physics, psychology, and Spanish. In the fields of accounting, economics, finance, German, and sociology, major work is not offered, but students majoring in other fields may take collateral work in these fields from the list of courses for advanced undergraduates and graduates ("100" courses).

Work leading to the doctorate is offered in the following fields: chemical engineering, chemistry, civil engineering, electrical engineering, English, geology, history, mathematics, mechanical engineering, metallurgical engineering, and physics.

Prospective students who are interested in graduate work in particular fields are in all cases advised to get in touch with the heads of the departments in question before attempting to register. Such consultation will be to their benefit in that they will get a definite understanding as to the adequacy of their preparation, as well as of the facilities the University has to offer for work in their fields.

#### **Admission to Graduate Standing**

A student who has taken the bachelor's degree or a degree in technology at a recognized college, university, or technical institution may be admitted as a graduate student. He must file at the office of the director of admissions a statement, on a form provided for the purpose, of his collegiate experience and of his graduate objectives, and an official transcript of his academic record. If this is satisfactory, he will then be admitted to graduate standing. Filing a transcript is not necessary in the case of work done at Lehigh University.

The University welcomes the submission of Graduate Record Examination scores by any person applying for admission or for scholarship aid, since these records convey valuable information about the students submitting them. For information about this examination write the Graduate Record Examination, 437 West 59th Street, New York City 19, New York.

Admission to graduate standing permits the student to take any course for which he has the necessary qualifications. *It does not imply admission to candidacy for a degree.* Admission to candidacy for an advanced degree is granted in accordance with the provisions set forth below under "Degrees."

Women are admitted as graduate students on the same terms as men. However, women are not admitted either as registered students or as listeners in courses primarily for undergraduates (courses numbered from 1 to 99), and their enrollment in courses open to advanced undergraduates and graduates ("100" courses), is subject to the special approval of the head of the department concerned. These restrictions do not apply during the summer semester.

Students of Lehigh University who are within a few hours of meeting the requirements for the bachelor's degree may, if given permission by the graduate faculty, enroll for a limited amount of work for graduate credit.

### Registration

The registration days for graduate students each semester are the Thursday, Friday, and Saturday following the undergraduate registration days (see calendar). The last day for graduate registration is the tenth day of instruction.

*It should be noted that the graduate work itself starts promptly at the beginning of the semester. It is frequently true that graduate courses can only be given if there is a certain minimum demand for them. Delay in enrolling for the course may therefore result in causing the course to be withdrawn for the semester.*

### Tuition and Fees

The tuition for graduate courses is at the rate of \$10.00 per semester hour.

All new students pay, once only on admission, a matriculation fee of \$5.00. Students at graduation pay a graduation fee of \$10.00.

A library fee of \$2.50 per semester and a health service fee of \$6.00 per semester are paid by all students registered for the regular semesters, except those registered for fewer than seven hours per semester.

Graduate students in residence who have met all course and residence requirements for the doctoral degree pay a dissertation fee of \$50.00 per semester.

For an unregistered master's thesis prepared in absentia, a reading fee of \$25.00 is charged.

For a doctoral dissertation prepared in absentia a reading fee of \$50.00 is charged.

Graduate students are given the option of paying or not paying the athletic fee of \$15.00 a year and the student activities fee of \$2.50 per semester. If they pay these fees, they obtain the corresponding benefits.

There are also laboratory fees or deposits in laboratory courses to cover the cost of laboratory supplies used by the individual students and to provide for breakage of glassware and instruments. The amounts of these fees and deposits are given in the description of courses in connection with each laboratory course.

### Refunds

For university regulations concerning refunds, see page 33.

### Members of the University Staff

Full-time members of the university staff may not take more than six semester hours of graduate work in any one semester; half-time members of the staff may not take more than ten semester hours.

### Filing of Application for Degree

Candidates for degrees on University Day file on or before May 15 a written notice of candidacy for the degree, which notice shall bear the bursar's receipt for the required graduation fee of \$10.00; candidates for degrees on Founder's Day file a similar notice of candidacy on or before September 25; candidates for degrees at the Midyear Commencement file before January 15. A blank to be used for this purpose is supplied by the registrar's office and filed with the bursar at the time of payment of the graduation fee. Failure to file such notice by the dates mentioned debars the candidate from receiving the degree at the ensuing graduation exercises. A candidate who pays his graduation fee and then fails to qualify for his degree will, on application, receive a refund of the fee.

## DEGREES

### Master of Arts and Master of Science

The master's degree is granted to properly qualified students who complete satisfactorily a full year of advanced work. In meeting the requirements for the degree, the student must comply with the following regulations:

1. All work which is to be credited toward a master's degree must be done in actual and regular attendance at Lehigh University.
2. A minimum of thirty semester hours is required for the master's degree.
3. Each candidate for a degree must submit for the approval of the graduate faculty the program of courses he proposes to take to satisfy the requirements for the master's degree. This program must have the approval of the head of the major department, and also of instructors in such courses, not in the major field, as may be included. Approval of the program by the graduate faculty signifies that the candidate has been formally admitted to candidacy for the degree.

4. At least eighteen of the required thirty semester hours must be taken in one department, which shall be the student's major department or field. The remaining twelve hours, or any part of them, may also be taken in the major department; or they may be taken in any other field in which courses for graduate credit are given, as the needs or interests of the student may indicate. The distribution of the work shall be made upon the advice and with the approval of the head of the major department. In all cases, the work for the master's degree must be taken under at least two instructors.

5. At least twelve of the eighteen semester hours required in the major department and at least fifteen of the thirty semester hours required for the degree must be taken in courses open primarily to graduates ("200" courses). Courses primarily for undergraduates are not accepted for graduate credit.

6. A thesis may be required by the major department. If required, the thesis shall not count for more than six semester hours. The credit to be allowed shall be fixed by the head of the major department. Two bound typewritten copies of the thesis (one of which shall be an original copy), approved by the faculty member under whom the work was done and by the head of the major department, shall be placed in the hands of the secretary of the graduate faculty at least two weeks before the day on which the degree is to be conferred. Information as to the form in which the thesis must be presented may be obtained from the librarian of the University or from the executive secretary of the graduate faculty.

7. The master's degree is not granted unless the candidate has earned the grades A or B in at least eighteen hours of the work on his program. No course in which the grade earned is less than C is credited toward the degree.

When all requirements have been met, the candidate is recommended by the faculty to the trustees for the master's degree appropriate to the work pursued.

#### **Doctor of Philosophy**

The degree of Doctor of Philosophy is conferred on candidates who have demonstrated general proficiency and high attainment in a special field of knowledge and capacity to carry on independent investigation in that field as evidenced by the presentation of

an acceptable dissertation embodying the results of original research. The requirements for the degree are more specifically set forth in the following regulations.

1. **TIME REQUIREMENTS.** A candidate is ordinarily expected to devote three or more academic years to resident graduate study. In no case is the degree awarded to one who has spent less than two full academic years in resident graduate work. Study for any specified period of time, however, is not in itself regarded as sufficient ground for the award of the degree.

Graduate work done in residence at other institutions will be accepted in partial fulfillment of the time requirements, provided such work is approved by the graduate faculty and by the departments concerned.

Work of fragmentary character scattered over a long period of years, or work completed many years before the student becomes a candidate for the degree at Lehigh will be reviewed by the graduate faculty and may be credited in part or in whole towards the fulfillment of the time requirements.

2. **RESIDENCE REQUIREMENTS.** A candidate for the degree must complete at least one full academic year of resident graduate study at Lehigh University.

3. **ADMISSION TO CANDIDACY.** Candidates for the doctorate are accepted in a limited number of departments only, and a department may limit the number of candidates accepted in any year. In exceptional cases new students may be admitted to candidacy immediately upon registration in the Graduate School. Ordinarily, however, they are required to spend at least one semester in residence before they are accepted as candidates. Admission to candidacy is granted by the graduate faculty, following written application by the student, upon the recommendation of the departments concerned. In passing upon a student's application, his general education, as well as his special qualifications for work in his chosen field, is taken into consideration. Each applicant is notified by the executive secretary of the graduate faculty, in writing, of the action of the faculty upon his application.

The application of a foreign student must be accompanied by a statement from the department in which he intends to specialize, certifying that he has a satisfactory command of English.

At the time of admission to candidacy a special committee is appointed by the executive committee of the graduate faculty to direct the work of the candidate.

4. **PLAN OF WORK.** The preparation for the degree is based on the study of a major subject, to which one or two minors may be added. The program of work to be formulated by the candidate, his special committee, and the head of his major department, should be planned to lead to a general mastery of the major field and to a significant grasp of any minor that may be added. The program must be approved by the executive committee of the graduate faculty.

While there is no definite requirement as to the number of courses to be taken, two years devoted to formal courses is the customary minimum. In no instance, however, is the degree awarded merely for the faithful completion of any program of courses.

5. **LANGUAGE REQUIREMENTS.** The candidate must give evidence, through examination, of a reading knowledge, sufficient for the purposes of his special studies, of at least two foreign languages (in addition to any language which may constitute his major subject). In each case the required languages are designated by the candidate's major department and approved by the graduate faculty. The language requirements must be satisfied before the student presents himself for the general examination, described below.

Language examinations are in charge of a committee consisting of representatives of the language department concerned and of the candidate's major department.

Permission to take the language examinations does not imply admission to candidacy for the degree.

6. **GENERAL EXAMINATION.** The general examination for the doctorate is designed to test both the student's capacity and his proficiency in his field of study. The examination is not necessarily confined to the content of courses that have been taken at Lehigh University or elsewhere. It is ordinarily held not earlier than toward the close of the second year of work, nor later than seven months prior to the time when the candidate plans to receive the degree. The student's special committee is in charge of the examination, which is both written and oral.

Application for admission to the general examination must be filed with the executive secretary of the graduate faculty at least one month before the time of the examination. No student is permitted to take this examination who has not been admitted to candidacy for the doctorate or who has not satisfied the language requirements.

Should a candidate fail in the general examination, he may be permitted by the graduate faculty to present himself for a second examination not earlier than five months after the first. If the results of the second trial are also unsatisfactory, no further examination is set.

7. DISSERTATION. The candidate is required to present a dissertation prepared under the general direction of a professor at Lehigh University. The dissertation shall treat a topic related to the candidate's major subject, embody the results of original research, give evidence of high scholarship, and constitute a contribution to knowledge. It must be approved by the professor under whose direction it was written, by the candidate's special committee, and by the graduate faculty. A copy bearing the written approval of the professor in charge must be presented to the executive secretary of the graduate faculty for transmission to the student's special committee not later than April 1, if the degree is to be conferred in May, or not later than September 1, if the degree is to be conferred in October.

The candidate shall deposit with the executive secretary of the graduate faculty, at least one week before the degree is to be conferred, (1) two typewritten copies (one an original copy) of the accepted dissertation, in standard form and binding; (2) an abridgement of the dissertation in a form suitable for publication and acceptable to the candidate's special committee. At the same time he shall deposit with the bursar of the University the sum of fifty dollars (\$50.00). This deposit will be refunded if the dissertation, or an acceptable summary including all its major results, is published within two years after the degree is awarded, in a place and form approved by the executive secretary of the graduate faculty. Otherwise the deposit will be used by the University to defray the cost of printing and distributing the original abridgment. The period of two years may be extended at the discretion of the graduate faculty.

8. FINAL EXAMINATION. After the dissertation has been accepted by the graduate faculty, the candidate will be orally examined by the officers of professorial rank in the departments concerned and such other persons as may be selected by the candidate's special committee. This examination is ordinarily held not later than May 1 of the last year of candidacy.

The candidate shall arrange the time for the examination with the executive secretary of the graduate faculty. Such arrangement must be made not later than April 1 if the degree is to be conferred in May, and not later than June 1 if the degree is to be conferred in October.

#### **Post Doctoral Work**

Students who have completed the requirements for the doctorate may enroll for post doctorate individualized study under the guidance of selected members of the faculty. Such a program of study contemplates a broad educational and research development at advanced and mature levels, and provides opportunities to prepare for specific positions. A formal certification of such work as may be accomplished by the student will be made.



## Description of Courses



## DESCRIPTION OF COURSES

Following is a list of the undergraduate and graduate courses offered by Lehigh University. The number of credit hours of each course is indicated by the figure in parentheses. Three hours of drawing, of work in the laboratory, or of practice in the field are regarded as equivalent to a recitation or lecture of one hour's duration. Under the accelerated program with students entering each semester, many courses designated as first semester courses will be taught also in the second semester and *vice versa* in accordance with student needs. The spring, summer, and fall semesters of 1944 are first, second, and first semesters respectively.

### Prerequisites

Prerequisites are of two kinds: primary prerequisites which are strictly essential; secondary prerequisites which are highly desirable but not absolutely essential. Secondary prerequisites may be waived by the head of the department concerned. In the following description of courses, primary prerequisites are printed in italics and secondary prerequisites in roman type. Junior standing is a primary prerequisite of all courses in the "100" group.

### ACCOUNTING

PROFESSOR COWIN  
ASSOCIATE PROFESSOR ALLEN  
DEAN CAROTHERS

### ACCOUNTING

#### Acctg. 1. Accounting (3).

The elementary principles of accounting with problem work to develop a knowledge of accounting method and practice. Financial statements and their preparation, analysis and recording of transactions, journalizing and posting, use of special ledgers and journals, adjusting and closing accounts. First semester.

#### Acctg. 2. Accounting (3).

Elementary accounting problems peculiar to proprietorships, partnerships, and corporations; manufacturing enterprises; depreciation; and a more detailed consideration of financial statements than is possible in Acctg. 1. Prerequisite: *Acctg. 1*. Second semester.

#### Acctg. 4. Accounting for Engineers (3).

An intensive course in the principles and practices of accounting, covering the fundamentals in one semester. Especially designed for engineering students. Prerequisite: *junior standing*. First and second semesters.

**For Advanced Undergraduates and Graduates**

**Acctg. 113. Advanced Accounting (3).**

Problems of the balance sheet, its form and content, the valuation of assets, liabilities, and problems relating to capital stock, surplus, and reserves. Prerequisites: *Acctg. 2 or 4.* First semester. Mr. Cowin

**Acctg. 114. Advanced Accounting (3).**

Problems of profit and loss statements, income, receiverships and bankruptcy, estates, and consolidated statements. Prerequisites: *Acctg. 2 or 4.* Second semester. Mr. Cowin

**Acctg. 115. Cost Accounting (3).**

The principles and methods used to determine unit costs of product or services. Material, labor, and overhead costs, methods of distributing overhead, and the application of cost principles to job order and process production. Prerequisite: *Acctg. 2 or 4.* First semester. Mr. Allen

**Acctg. 118. Advanced Cost Accounting (3).**

Special cost problems such as: standard costs, distribution costs, joint costs. The managerial use of cost data, control of costs, and design of cost accounting systems. Prerequisite: *Acctg. 115.* Second semester.

Mr. Allen

**Acctg. 120. Auditing (3).**

The different types of audits and special investigations. Problems involving audit principles and procedure; methods of detecting and preventing fraud; the writing of audit reports; the ethics and the legal responsibilities of accountants. Prerequisite: *Acctg. 2 or 4.* Second semester.

Mr. Allen

**Acctg. 171. Readings in Accounting (3).**

An unrostered course designed for students in the College of Arts and Science majoring in accounting, and for students in the College of Business Administration having special interest in some phase of accounting not covered by the rostered courses. The study may be in the history of accounting, accounting theory, municipal or public utility accounts, or any special subject approved by the instructor. Prerequisites: *senior standing and Acctg. 2 or 4.* First semester. Mr. Cowin

**Acctg. 172. Readings in Accounting (3).**

Continuation of *Acctg. 171.* Prerequisites: *senior standing and Acctg. 2 or 4.* Second semester. Mr. Cowin

**ECONOMIC STATISTICS**

**For Advanced Undergraduates and Graduates**

**E.S. 145. Statistical Method (3).**

The methods of statistical description and induction, including tabular and graphic analysis and presentation. Prerequisite: *Eco. 4.* First semester.

## BIOLOGY

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### **E.S. 146. Business Cycles and Forecasting (3).**

The nature of the business cycle and the application of statistics to business trends, with special attention to forecasting and business barometers. Prerequisite: E.S. 145. Second semester.

### **E.S. 147. Statistical Analysis (3).**

Analysis of the problem of measuring economic categories such as industrial growth, national income, price variation, and demand. The significance of data; method. Not offered in 1944. Prerequisite: E.S. 146. First semester.

### **E.S. 148. Advanced Business Cycles (3).**

Recent business cycle theories; the evolution of the theories, and the problems of economic change which the theories attempt to explain. Prerequisite: E.C. 146. Not offered in 1944. Second Semester.

## LAW

### **Law 2. Business Law (3).**

A course designed primarily for students of accounting. The law of partnership, corporations, property, personal relations, insurance, transportation, bailments, patents, copyrights, and trademarks. Prerequisite: Eco. 4. Second semester.

### **For Advanced Undergraduates and Graduates**

### **Law 102. Business Law (3).**

The law of contracts, sales, negotiable instruments, and bankruptcy. Prerequisite: Eco. 4. Second semester. Mr. Carothers

### **Law 103. Federal Tax Law (3).**

The most recent revenue acts; procedure in using the law and regulations to determine the amount of the tax liability. Income tax, estate tax, gift tax, capital stock tax, excess profits tax, and other related federal taxes. Prerequisite: *Acctg. 2 or 4*. First semester. Mr. Cowin

## ASTRONOMY

See Mathematics and Astronomy

## ATHLETICS

See Division of Intercollegiate Athletics

## BIOLOGY

PROFESSOR S. J. THOMAS  
ASSOCIATE PROFESSOR TREMBLEY

### **Biol. 1. Biology (3).**

General distribution requirements for arts students who do not intend to major in biology. Topics studied are: protoplasm, metabolism of lower forms of life, anatomy and physiology of multicellular animals. Origin

of life, genetics, and eugenics. Evolution. Two recitations and one laboratory period per week. Fee, \$3.00. First semester.

**Biol. 2. Mammalian Anatomy (2).**

Detailed dissection of a mammal. Two laboratory periods a week. Prerequisite: Biol. 10 or its equivalent. Fee, \$5.00. Second semester.

**Biol. 3. Comparative Anatomy of Vertebrates (3).**

The dissection of types of the several vertebrate classes in the laboratory. Recitations on functional and anatomical differences. Prerequisite: Biol. 10 or its equivalent. Fee, \$3.00. First semester.

**Biol. 4. Vertebrate Embryology (3).**

A lecture, recitation, and laboratory course on the development of vertebrates. Laboratory work on the embryology of an amphibian and the chick, demonstrating the successive stages of cleavage, gastrulation, germ layer formation, and development of tissues and organs. Prerequisites: *Biol. 10 or its equivalent; Biol. 3.* First semester.

**Biol. 6. Botany (3).**

Fundamentals of the morphology and physiology of plants. The evolutionary development of the plant kingdom. Two lectures and one laboratory period per week. Field trips in the spring. Fee, \$3.00. Second semester.

**Biol. 7. Elementary Biology (3).**

A survey course in biological principles leading to an understanding of man's place in his living and non-living environment.

**Biol. 8. Elementary Biology (3).**

Continuation of Biol. 7. The theories of genetics, eugenics, and human evolution. Prerequisite: Biol. 1 or 7. Second semester.

**Biol. 10. Zoology (3).**

A foundation course for majors in biology. Living things are studied from a functional rather than purely morphological viewpoint. Protoplasm, cellular metabolism, reproduction, and other fundamental conceptions of life-processes. Recitations, lectures, and laboratory. Fee, \$3.00. First semester.

**Biol. 11. Animal Ecology (3).**

A recitation, lecture, laboratory, and field course in the fundamentals of animal taxonomy and conservation. Basic interrelationships between animals and their physical and biological environments, animal successions, type habitats, and economic ecology. Laboratory work in the morphology of the invertebrate phyla and the classes of vertebrates. Observations of animals in their local habitats. Prerequisite: Biol. 1 or its equivalent. Fee, \$3.00. Second semester.

**Biol. 13. Human Biology (3).**

Fundamental principles of biology using man as a type. Man's place in nature. The biology of the individual. Protoplasm. The body as a whole. Man's organ system. Group biology. Man in relation to his environment. Genetics and human inheritance. The future of man. Human evolution. First and second semesters.

**Biol. 14. Genetics and Eugenics (1).**

Designed for students who are not majoring in biology. The laws of heredity, modern conception of the gene, natural and artificial mutations, the mechanism of evolution, evolutionary trends of the human race, and methods of eugenics betterment. Second semester.

**Biol. 15. Freshman Hygiene.**

Four lectures on social hygiene, with the cooperation of the director of the students' health service. Given during freshman week. Required of all freshmen. Either this course or Biol. 16 must be passed before graduation.

**Biol. 16. Social Hygiene.**

For students who have not passed Biol. 15. Second semester.

**Biol. 18. Genetics (2).**

A study of the basic laws governing inheritance in plants and animals, chromosome behaviour, nature of genes. The relation of environmental modifications, hybrid variations, and mutations to the mechanics of evolution. Prerequisite: Biol. 10 or its equivalent. Second semester.

**Biol. 20. Physiology (3).**

Recitations and demonstrations covering the principles underlying the operation of life-processes. The subject matter is not limited to any one group of organisms, but is derived from living things in general. Prerequisites: Biol. 3, 10; Chem. 150; *Phys. 12, 16, and 17*. Second semester.

**Biol. 21. Hygiene (3).**

A recitation course in the physiology and anatomy of the human body. The evolution and development of organs and systems. Their structures, functions, and interrelationships as a scientific basis for appropriate attitudes and habits concerning health. Second semester.

**Biol. 22. Hygiene (1).**

A brief course in the essentials of personal and public health. Designed especially for students who will become responsible for the health habits of others under their supervision or command. First semester.

**Biol. 23. Hygiene (1).**

A continuation of Biol. 22. Second semester.

**Biol. 36. Economic Botany (3).**

Economic products of plant origin from the point of view of their development, structural characteristics, uses, and sources. Two recitations and one laboratory period per week. Fee, \$3.00. First semester.

**Biol. 50. Sanitary Bacteriology (3).**

Study of bacteria and allied microörganism by staining and cultural methods; their sanitary importance in public water supplies; the bacteriology of sewage and sewage treatment; qualitative and quantitative bacteriological and biological analysis of water, milk, and sewage. Lectures, recitations, and laboratory work. Fee, \$3.00. Second semester.

**Biol. 52. Bacteriology (3).**

Elementary general bacteriology. The morphological and cultural characteristics of bacteria and allied microörganisms; special attention to forms of sanitary and economic importance; the role of bacteria, yeasts, and molds in fermentation industries, in water and milk, and in disease. Lectures, recitations, and laboratory work. Fee, \$3.00. First semester.

**Biol. 54. Bacteriology (3).**

An elementary course for students specializing in biological sciences. Special staining methods in the study of morphology; differential media in bacterial physiology; thorough study of the microörganisms themselves rather than their specific sanitary or industrial importance. Recitations, lectures, and laboratory work. Fee, \$3.00. First semester.

**Biol. 55. Biology of Bacteria (3).**

A recitation and laboratory course in the study of life processes, using bacteria for demonstration. Cell structure, growth and reproduction, heredity and variation, metabolism, adaption and parasitism, etc., as examples of the relationships of all living things. Fee, \$3.00. Second semester.

**For Advanced Undergraduates and Graduates**

**\*Biol. 106. Natural History and Ecology (3).**

Identification and life habits of local plants and animals. Laboratory training in the use of analytical keys and of collections of reference, and the correct methods of making collections. Trips to local regions of natural interest for field identification and study of interrelationships of living organisms. Conservation, conservation programs, and appreciation of nature. Three lectures, one laboratory, and one field trip a week. Fee, \$2.00. Summer session. Mr. Trembley

**Biol. 113. Histology (3).**

The technique of fixing, cutting, and differential staining of animal tissue; the recognition of normal mammalian tissues. Prerequisites: Biol. 10 and 3 or their equivalent. Fee, \$3.00. Second semester. Mr. Trembley

\* This course is not available as part of a graduate major in biology.

**Biol. 153. Advanced Bacteriology (3).**

A laboratory and recitation course in medical bacteriology; cultural study of the more common pathogenic bacteria. Prerequisite: Biol. 50, 52, or 54. Fee, \$3.00. Second semester. Mr. Thomas

**Biol. 155. Industrial Bacteriology (3).**

An advanced laboratory course in bacteriology including aspects of industrial chemistry in which bacteria play an essential part in the process, as in the manufacture of acetone, butanol, acetic, and lactic acids. Prerequisites: at least two years of chemistry, including quantitative analysis, Biol. 52 or 54. Fee, \$3.00. Second semester. Mr. Thomas

**Biol. 158. Immunology (3).**

A comprehensive recitation course in the history of the study of immunity and modern theories concerning its mechanism. Prerequisite: Biol. 153. First semester. Mr. Thomas

**Biol. 161. Public Sanitation (3).**

A laboratory study of the biological, chemical, bacteriological, and physical aspects of public water supplies, systems of sewage disposal, and milk distribution. Prerequisite: at least two years of chemistry, including quantitative analysis, Biol. 50, 52, or 54. Fee, \$3.00. First semester. Mr. Thomas

**For Graduates**

Prerequisite for graduate work in biology: the amount of biology usually obtained by an undergraduate majoring in that department. Prerequisite for graduate work in bacteriology: a satisfactory course in undergraduate bacteriology and a sufficient preparation in organic chemistry. Ability to undertake graduate work in bacteriology must be demonstrated by previous scholastic record, an examination, or both.

**Biol. 203. Vertebrate Histogenesis and Organogenesis (3).**

Careful following, in the laboratory, of the development of a vertebrate; tracing of the history of the germ-layers, organs, and tissues. The association of tissues to form organs. First semester. Mr. Trembley

**Biol. 207. Biological Research (3).**

Investigations in any phase of the biological sciences according to preparation and interests. First semester. Messrs. Thomas, Trembley

**Biol. 208. Biological Research (3).**

Continuation of Biol. 207. Second semester. Messrs. Thomas, Trembley

**Biol. 209. Advanced Morphology (3).**

A laboratory course in special phases of morphology, such as comparative osteology, comparative morphology, or embryology of the invertebrates, etc. to meet the individual interest of the student. First or second semester.

Mr. Trembley

**Biol. 210. Biological Theories (3).**

An advanced course in genetics and evolution. First or second semester.

Messrs. Thomas and Trembley

**Biol. 260. Serology (3).**

A laboratory course in the preparation of antigens, immunization of animals, and the study of antigen-antibody reactions. To be taken concurrently with or following Biol. 158. Prerequisite: Biol. 153. First or second semester.

Mr. Thomas

**Biol. 262. Microbiology (3).**

The higher bacteria, yeasts, molds, algae, and protozoa of interest to the bacteriologist. Practical applications to sanitary bacteriology, water supplies, sewage disposal systems, food spoilage and, to a limited extent, human and animal pathology. First or second semester.

Mr. Thomas

**Biol. 263. Physiology of Bacteria (3).**

The biochemistry of bacterial metabolism, zymology, respiration, nutrition, reproduction. First or second semester.

Mr. Thomas

**Biol. 264. Epidemiology (3).**

A seminar dealing with historic epidemics of typhoids, cholera, plague, diphtheria, and the venereal diseases; the methods of transmission of the organisms concerned with mass infections; modern immunological and sanitary practice in prevention. First or second semester.

Mr. Thomas

**Biol. 265. Industrial Biology (3).**

A laboratory course in the preparation and standardization of biological products used in active immunization, diagnosis, and serum therapy. Prerequisite: Biol. 158 and 260. First or second semester.

Mr. Thomas

**Biol. 266. Public Health Administration (3).**

The organization of national, state, and local health services. The relationship between official and volunteer health agencies. The functions of medical health officer, epidemiologist, public health nurse, and sanitary inspectors in a public health program. The various phases of health work, such as eugenics, personal, social and industrial hygiene, sanitation, vital statistics, and public education. First or second semester.

Mr. Thomas

**Biol. 267. History of Bacteriology (3).**

Reading, conferences, and written reports. First or second semester.

Mr. Thomas

**Biol. 268. History of Biology (3).**

A course based on reading, conferences, and written reports. First or second semester.

Mr. Trembley

**BUSINESS ADMINISTRATION**

**See Accounting, Economics and Sociology, and Finance**

**CHEMISTRY AND CHEMICAL ENGINEERING**

PROFESSORS NEVILLE, DIEFENDERFER, THEIS, SIMMONS,  
AND ANDERSON

ASSOCIATE PROFESSORS BILLINGER, HAZLEHURST, AMSTUTZ,  
AND SERFASS

ASSISTANT PROFESSORS BECK, SMULL, ZETTLEMOYER,  
AND WENDLAND

**Chem. 1. Elementary Chemistry (2).**

Elementary phenomena and principles of chemistry. Lectures illustrated by experiments, diagrams, working drawings, and museum specimens. Given in conjunction with Chem. 11. First and second semesters.

**Chem. 2. Elementary Chemistry (2).**

Recitations and demonstrations. Primarily for students in the curriculum of arts and science and in the curriculum of business administration. Given in conjunction with Chem. 12. First and second semesters.

**Chem. 3. Intermediate Chemistry (2).**

A course for students who pass the examination in elementary chemistry held during freshman week. Prerequisite: satisfactory preparation in the rudiments of chemistry. First semester.

**Chem. 6. Inorganic Chemistry (3).**

Family relationships among the elements. Systematic survey of inorganic chemical compounds, their occurrence, properties, and reactions. Prerequisites: *Chem. 1 and 11, or 3 and 13; Chem. 20; Chem. 8.* First semester.

**Chem. 7. Physical Chemistry (3).**

Introduction to physical chemistry; states of matter, change of state, solutions, surface phenomena; nuclear, atomic, and molecular structure. Prerequisite: Chem. 6. Second semester.

**Chem. 8. Stoichiometry (1).**

Chemical problems and reactions. Prerequisites: Chem. 1 and 11, or 2 and 12, or 3 and 13. Second semester.

**Chem. 9. Elements of Physical Chemistry (3).**

Kinetic theory, change of state, solutions, equilibria, electrochemistry, colloidal phenomena. Especially designed for biology majors. Prere-

quisites: *Chem. 1 and 11, or 3 and 13; Chem. 20; Chem. 8.* Second semester.

**Chem. 11. Chemistry Laboratory (2).**

Experiments covering a systematic study of the chemical and physical properties of the more important elements and their compounds. Given in conjunction with Chem. 1. Deposit, \$15.00. First and second semesters.

**Chem. 12. Chemistry Laboratory (1).**

An abridgment of Chem. 11. Given in conjunction with Chem. 2. Deposit, \$15.00. First semester.

**Chem. 13. Chemistry Laboratory (2).**

Experiments designed to accompany Chem. 3. Prerequisite: satisfactory preparation in the rudiments of laboratory chemistry. Deposit, \$15.00. First semester.

**Chem. 14. Chemistry Laboratory (1).**

Primarily for arts and science and business administration students. An abridgment of Chem. 13. Deposit, \$15.00. First semester.

**Chem. 20. Elementary Chemistry and Qualitative Analysis (3).**

Chemistry of the metals and their industrially interesting compounds. The fundamental scientific principles of precipitation, and the practice of qualitative analysis by semi-micro methods. Prerequisites: *Chem. 1 and 11, or 2 and 12, or 3 and 13.* Deposit, \$25.00. Second semester.

**Chem. 30. Quantitative Analysis (3).**

Practical work in the quantitative laboratory, accompanied by lectures and recitations; an introduction to gravimetric analysis method and typical fundamental volumetric processes. Prerequisites: *Chem. 1 and 11, or 2 and 12, or 3 and 13, 20;* Chem. 8. Deposit, \$30.00. First semester.

**Chem. 31. Quantitative Analysis (3).**

Continuation of Chem. 30. Analysis of metallic products, ores, and alloys of industrial interest chosen to represent the application of quantitative chemical principles to analysis. Prerequisites: *Chem. 1 and 11, or 3 and 13, 20;* Chem. 30. Deposit, \$30.00. Second semester.

**Chem. 36. Quantitative Analysis (2).**

An abridgment of Chem. 30 for mining and metallurgical engineers. Prerequisites: *Chem. 1 and 11, or 2 and 12, or 3 and 13; 20;* Chem. 8. Deposit, \$25.00. First semester.

**Chem. 39. Assaying, Coal, Gas, and Oil Analysis (4).**

The furnace assay of ores of lead, gold, and silver, and of gold and silver bullion; cyanidization; calculus for slag and slag mixtures; the analysis of boiler water, mine water, coal, coke, tar, gas, petroleum and

petroleum products; calorimetry. Prerequisites: *Chem. 8 and 30, or 36.* Deposit, \$30.00. Summer session: a lecture and seven hours of laboratory work each week-day for four weeks. Not offered in 1944-45.

**Chem. 41. Quantitative Analysis Conference (1).**

Lectures and recitations concerning the scientific foundations and laboratory practice of Chem. 30. Prerequisites: *Chem. 1 and 11, or 3 and 13, 20.* First and second semesters.

**Chem. 45. Quantitative Analysis Conference (1).**

Continuation of Chem. 41. Lectures and recitations to accompany Chem. 31. Prerequisites: *Chem. 1 and 11, or 2 and 12, or 3 and 13, 20;* Chem. 41. Second semester.

**Chem. 48. Quantitative Analysis Conference (1).**

Lectures and recitations to accompany Chem. 36. Prerequisites: *Chem 1 and 11, or 2 and 12, or 3 and 13, 20.* First semester.

**Chem. 50. Industrial Employment.**

During the summer following the junior year students in the curricula in chemistry and chemical engineering are required to gather industrial experience by at least eight weeks' work in industrial plants or laboratories. A written report is required. Not offered in 1943-44.

**Chem. 97. Research Chemistry Laboratory (3).**

A variant of Chem. 99 requiring 3 credit hours. Deposit, \$15.00. Second semester.

**Chem. 99. Research Chemistry Laboratory (2).**

Advanced study or an investigation involving intensive laboratory and library study. Deposit, \$15.00. Second semester.

Among advanced topics in active research are:

Absorption, Analytical Pro-	Natural and Synthetic Res-
cesses	ins
Drying Oils	Pigments
Engineering Processes	Aldol Syntheses
Heterocyclic Organic Com-	Plastics
pounds	Surface Chemistry
Hydration of Inorganic Salts	Tanning and Leather Tech-
Kinetics of Combustion	nology
Photomicrography	X-ray Technique

**For Advanced Undergraduates and Graduates**

**Chem. 110. Modern Aspects of Chemistry for Secondary Schools (3).**

Review of the latest developments in chemistry; atomic structure, solutions, electrolytes, acids. Discussion of the proper presentation of such

topics at the secondary school level. Correlation of such material with the current offerings in secondary schools. Open primarily to teachers of chemistry or general science in secondary schools. Summer session.

Mr. Hazlehurst

**Chem. 134. Radiation Methods (2).**

The application of radiation methods, mainly X-ray methods, to chemical and industrial chemical problems. Prerequisite: senior standing. First semester.

Mr. Anderson

**Chem. 135. Radiation Methods (2).**

Continuation of Chem. 134. Amplification of X-ray diffraction methods. Space groups. Crystal chemistry. Prerequisite: senior standing. Second semester.

Mr. Anderson

**Chem. 137. Advanced Analytical Chemistry (3).**

One conference and two laboratory periods per week. Prerequisite: 8 hours of quantitative analysis. Deposit, \$30.00. Second semester.

Mr. Serfass

**Chem. 144. Radiation Methods Laboratory (1).**

Laboratory in connection with Chem. 134. Prerequisite: senior standing. Deposit, \$10.00. First semester.

Mr. Anderson

**Chem. 145. Radiation Methods Laboratory (1).**

Continuation of Chem. 144. Prerequisite: senior standing. Deposit, \$10.00. Second semester.

Mr. Anderson

**Chem. 150. Organic Chemistry (3).**

Systematic survey of the typical compounds of carbon; their classification and general relations; study of synthetic reactions. Prerequisites: *Chem. 20, 30*. First semester.

Mr. Amstutz

**Chem. 151. Organic Chemistry (3).**

Continuation of Chem. 150. Prerequisites: *Chem. 20, 30*; Chem. 150. Second semester.

Mr. Amstutz

**Chem. 155. Qualitative Organic Chemistry (1).**

Systematic laboratory study of classification reactions of pure organic substances and mixtures. Applications to the identification of some industrial products. Prerequisites: *Chem. 150, 151, 165, and 166 or 167*. Deposit, \$10.00. First semester.

Mr. Smull

**Chem. 158. Advanced Organic Chemistry (3).**

Advanced topics in organic chemistry. Continuation of Chem. 151. Prerequisites: *Chem. 150, 151, 165, and 166 or 167*. First semester.

**Chem. 159. Advanced Organic Chemistry (3).**

Chemistry of unsaturated compounds; addition reactions, condensations, polymerization. Effect of inhibitors and catalysts. Prerequisites: *Chem. 151 and 166 or 167*. Second semester.

Mr. Smull

**Chem. 165. Organic Chemistry Laboratory (2).**

Preparation of pure organic compounds. Prerequisites: *Chem. 20; Chem. 30.* Deposit, \$30.00. First semester.

Messrs. Smull, Amstutz, Zettlemoyer

**Chem. 166. Organic Chemistry Laboratory (3).**

Continuation of Chem. 165. Practical methods of saturation, nitration, reduction, diazotization, sulphonation, etc.; preparation of pure compounds; study of the properties of dyes and other commercial products. Prerequisites: *Chem. 20; Chem. 30 and 165.* Deposit, \$40.00. Second semester.

Messrs. Smull, Amstutz, Zettlemoyer

**Chem. 167. Organic Chemistry Laboratory (2).**

Similar to Chem. 166, but shorter. Prerequisites: *Chem. 20; Chem. 30 and 165.* Deposit, \$40.00. Second semester.

Messrs. Smull, Amstutz, Zettlemoyer

**Chem. 168. Advanced Organic Laboratory (2).**

The synthesis, characterization, structure determination, and ultimate analysis of organic compounds. Prerequisite: *Chem. 165 and 166 or 167.* Deposit, \$30.00. First semester.

Messrs. Smull, Amstutz

**Chem. 169, 171, 172. See under Chemical Engineering.**

**Chem. 179. History and Literature of Chemistry (1).**

Chronological development of the science with assigned reading. Survey of reference books and journals. Prerequisites: *Chem. 6 and 150.* Second semester.

Mr. Billinger

**Chem. 190. Physical Chemistry (3).**

Continuation of Chem. 7. The laws of thermochemistry, solutions, rates of reaction, and chemical equilibrium in homogeneous and heterogeneous systems based on thermodynamic and kinetic concepts. Prerequisites: *Math. 13, Phys. 23 and 24 or 16, 17; Math. 14, Chem. 7.* First semester.

Mr. Zettlemoyer

**Chem. 193. Physical Chemistry Laboratory (2).**

Physical chemical measurements. Prerequisites: *Math. 13, Chem. 30 or 36; Phys. 23, 24, or 16, 17; Math. 14, Chem. 7.* Deposit, \$10.00. First semester.

Messrs. Ewing, Zettlemoyer

**Chem. 194. Physical Chemistry and Electrochemistry (3).**

Continuation of Chem. 190. The laws of conductivity, current, electromotive force and energy relations of electrolytes in solutions and in the molten state. Prerequisites: *Math. 13, Phys. 23 and 24 or 16, 17; Math. 14, Chem. 190.* Second semester.

**Chem. 197. Electrochemistry Laboratory (1).**

Experimental study of electrochemical reactions. Measurements of conductivity, current and electromotive force. Prerequisite: *Math. 13, Chem. 30 or 36, Phys. 23 and 24 or 16, 17; Math. 14, Chem. 190.* Deposit, \$5.00. Second semester.

Mr. Zettlemoyer

**For Graduates**

The prerequisite for graduate work in chemistry as a major study toward the doctorate or the master's degree are: inorganic chemistry and qualitative analysis (8), quantitative analysis (8), organic chemistry (10), physical chemistry (5), physics (12), and mathematics, including calculus (12). Students of exceptional ability may be able to make up minor deficiencies while carrying graduate work. If the deficiencies are serious, a student can hardly expect to complete the requirements for the master's degree within the minimum time.

Graduate students may choose either chemistry or chemical engineering as the major subject. If chemical engineering is the major subject, a number of courses in chemistry, adapted to the needs of the student, will be taken as collateral work. Other subjects may be chosen in related fields, usually physics and mathematics. Men majoring in chemistry will take collateral work in science, with such engineering topics as may be suited to their objectives. Suggested graduate collateral sequences which carry forward from selected undergraduate electives, see page 84, are:

**Business Administration**

Acctg. 115. Cost Accounting	Acctg. 118. Adv. Cost Acctg.
Eco. 107. Adv. Economics	Eco. 108. Adv. Economics

**Mathematics—Physics**

Phys. 160. Intro. to Modern Phys. Theories	Phys. 161. Intro. to Modern Phys. Theories
or Math. 111. Diff. Equations	or Math. 112. Diff. Equations
or Phys. 124. Elec. Discharge through Gases	or Phys. 170. Spectroscopy

**Biochemistry**

Biol. 155. Industrial Bacteriology	Biol. 161. Public Sanitation
C.E. 128. Sanitary Engr.	C.E. 131. Adv. Sanitary Engr.

**Education**

Educ. 151. Organ. of Materials of Instruction	Educ. 150. Principles of Second- ary Education
Educ. 219. Social Policy and Edu- cation	Educ. 130. History of Ed. in Europe

**Chem. 200. Inorganic Chemistry Research (4).**

Investigation in the field of organic and colloid chemistry. Deposit, \$30.00. First semester. Messrs. Neville, Hazlehurst, Fornoff

**Chem. 201. Inorganic Chemistry Research (4).**

Continuation of Chem. 200. Deposit, \$30.00. Second semester.  
Messrs. Neville, Hazlehurst

**Chem. 202. Advanced Inorganic Chemistry (2).**

The periodic system and atomic structure, theories of valence with particular attention to the Werner theory of complex compounds, inorganic free radicals, reactions in non-aqueous media, and study of the properties and reactions of certain elements with emphasis on recent developments. First semester.

**Chem. 203. Advanced Inorganic Chemistry (2).**

Continuation of Chem. 202. Second semester. ✓

**Chem. 230. Quantitative Analysis Research (4).**

Investigation of problems in analytic procedures. Deposit, \$30.00. First semester.  
Messrs. Diefenderfer, Serfass, Lafferty

**Chem. 231. Quantitative Analysis Research (4).**

Continuation of Chem. 230. Deposit, \$30.00. Second semester.  
Messrs. Diefenderfer, Serfass

**Chem. 236. X-ray Research (3).**

The investigation of chemical and industrial problems by X-ray diffraction methods. Deposit, \$30.00. First semester.  
Mr. Anderson

**Chem. 237. X-ray Research (3).**

Continuation of Chem. 236. Deposit, \$30.00. Second semester.  
Mr. Anderson

**Chem. 252. Organic Chemistry: Heterocyclic Compounds (3).**

The chemistry of thiophene, pyrrole, furan, pyridine, and their derivatives considered from the viewpoint of recent organic theories of structure and reaction mechanisms. Second semester.  
Mr. Amstutz

**Chem. 258. Topics in Organic Chemistry (3).**

Mechanisms, thermodynamics and kinetics of hydrogenation, de-hydrogenation, oxidation; Keto-enol isomerism; molecular rearrangement; catalysts. Some application to practice. Prerequisite: Chem. 158. Second semester.  
Mr. Zettlemoyer

**Chem. 260. Organic Chemistry Research (4).**

Investigation of a problem in organic chemistry. Deposit, \$30.00. First semester.  
Messrs. Smull, Amstutz

**Chem. 261. Organic Chemistry Research (4).**

Continuation of Chem. 260. Deposit, \$30.00. Second semester.  
Messrs. Smull, Amstutz

**Chem. 266. Advanced Organic Preparations (2).**

Mainly a laboratory course. Deposit, \$30.00. Second semester.  
Messrs. Smull, Amstutz

**Chem. 271. The Chemistry of the Proteins (3).**

A study of the proteins, amino acid and nucleic acids, their properties, composition, degradation products, oxidation and chemical reactions, synthesis, and analysis. Second semester. Mr. Theis

**Chem. 272. The Chemistry of the Carbohydrates (3).**

A study of the simple and complex sugars, starches, and cellulose, their synthesis, analysis, reactions, biological relations, occurrence, and industrial applications. First semester. Mr. Theis

**Chem. 290. Physical Chemistry Research (4).**

Investigation of a problem in physical chemistry; vapor pressure and calorimetric studies in the constitution of inorganic salts. Prerequisites: the equivalent of Chem. 190, 193, 194. Deposit, \$30.00. First semester.  
Messrs. Ewing, Zettlemoyer

**Chem. 291. Physical Chemistry Research (4).**

Continuation of Chem. 290. Deposit, \$30.00. Second semester.  
Mr. Zettlemoyer

**Chem. 292. Theoretical Chemistry: Kinetics (3).**

Kinetic theory of gases and its application to unimolecular and bimolecular reactions. Chain reactions. Explosions. Reactions in solutions. Heterogeneous reactions. Theory of absolute reaction rates. Prerequisites: A good working knowledge of mathematics, Chem. 294. Second semester.  
Mr. Zettlemoyer

**Chem. 293. Theoretical Chemistry: Kinetics (3).**

Continuation of Chem 292. Kinetics of explosions of solids. Combustion and explosion of hydrogen and hydrocarbons. Polymerization. Kinetics of organic reactions. First semester. Mr. Zettlemoyer

**Chem. 294. Theoretical Chemistry: Thermodynamics (3).**

Thermodynamics theory of chemical equilibria; activity method of treating solutions; systematic free energy calculations. Prerequisites: a good working knowledge of mathematics and the equivalent of Chem. 190, 193, and 194. First semester. Mr. Hazlehurst

**Chem. 295. Theoretical Chemistry: Thermodynamics (3).**

Continuation of Chem. 294. Statistical theory of thermodynamics; heat capacity equations; quantum theory in chemical thermodynamics; reports and discussions on selected topics. Second semester. Mr. Hazlehurst

**Chem. 296. Surface Chemistry (3).**

Colloidal systems; surface phenomena. Lectures and reports. First semester. Mr. Neville

C H E M I C A L   E N G I N E E R I N G

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**Chem. 297. Surface Chemistry (3).**

Continuation of Chem. 296. Applications of colloid chemistry; contact catalysis; special topics. Lectures and seminar. Second semester.

Mr. Neville

**Chem. 298. Advanced Physical Chemistry Seminar (3).**

An intensive study of some field of physical chemistry. First and second semesters. Mr. Zettlemoyer

**Chem. 299. Physical Chemistry Methods (2).**

Advanced course in methods of physical chemistry laboratory practice. Prerequisite: the equivalent of Chem. 193 and 197. Deposit, \$30.00. First semester.

**C H E M I C A L   E N G I N E E R I N G**

PROFESSORS SIMMONS, THEIS, AND ANDERSON  
ASSOCIATE PROFESSORS BILLINGER, AND SERFASS  
ASSISTANT PROFESOR STOOPS

**Ch.E. 50. Industrial Employment.**

During the summer following the junior year students in the curriculum in chemical engineering are required to gain industrial experience by at least eight weeks' work in industrial plants or laboratories. A written report is required. Not required in accelerated program.

**Ch.E. 78. Chemical Engineering (3).**

Principles of chemical engineering related to fluid flow, materials, handling, disintegration and mechanical separation. Assigned reading in texts and current literature on industrial processes. Prerequisites: *Math. 13; Math. 14, Chem. 30 and 41.* First semester.

**Ch.E. 79. Chemical Engineering (3).**

A continuation of Chem. 78. including heat generation and exchange. (Two hours lectures and three hours laboratory). Prerequisites: *Math. 14; Chem. 6, 31, 45, and 150; Ch.E. 78.* Deposit, \$15.00. Second semester.

**Ch.E. 80. Industrial and Engineering Chemistry (3).**

Introduction to chemical engineering principles through a study of unit process operations in various chemical industries. Prerequisites: *Chem. 30 and 41; Math. 14.* Second semester.

**For Advanced Undergraduates and Graduates**

**Chem. 169. Industrial Biochemistry Laboratory (1).**

Laboratory work to accompany Chem. 171. Prerequisites: Chem. 150 and 165. Deposit, \$15.00. First semester. Messrs. Theis, Serfass

**Chem. 171. Industrial Biochemistry (3).**

The inorganic, organic, and physical chemistry of life processes and their products. Atomic and molecular structure, equilibria, colloidal

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state, catalysts, osmosis, synthesis, oxidation, and reduction as applying to carbohydrates, proteins, fats, lipoids, and their interrelations. This course may be taken without Chem. 169. Prerequisites: Chem. 150, 151, 165, and 166 or 167. First semester. Mr. Theis

**Chem. 172. Industrial Biochemistry (3).**

Continuation of Chem. 171 with special adaptations to tanning, foods, fermentation industries, sanitation, and sewage disposal. Second semester. Mr. Theis

**Ch.E. 180. Chemical Engineering (3).**

A continuation of Chem. 79, including phase change separation, design and cost data on unit processes and manufacturing plants. Visits to industrial plants in the Philadelphia area for inspection of large units are a part of the course. (Two hours lecture and three hours laboratory). Prerequisites: *Chem. 31, 45, and 150; Ch.E. 78. Chem. 7, 9, and 151; Ch.E. 79.* Deposit, \$25.00. First semester. Mr. Simmons

**Ch.E. 181. Chemical Engineering (3).**

Continuation of Chem. 180. Visits to industrial plants in the New York area are a part of the course. Prerequisites: *Ch.E. 79 and M.E. 29; Chem. 180, 190, and 193.* Second semester. Mr. Simmons

**Ch.E. 183. Unit Processes (3).**

The chemical reactions, equipment and operating conditions of industrial processes involving alkylation, amination, diazotization, esterification, halogenation, hydrolysis, nitration, polymerization, sulfonation, etc. Prerequisites: *Chem. 150; Ch.E. 78 or Ch.E. 80; Chem. 151.* First semester.

**Ch.E. 185. Chemical Engineering Practice (1).**

Comprehensive studies in nearby manufacturing plants of a few processes involving one or more unit engineering operations. These studies usually occupy time covering whole days or multiples thereof. Prerequisite: Ch.E. 180. Deposit, \$10.00. Second semester. Mr. Simmons

**For Graduates**

**Ch.E. 280. Industrial Chemistry and Chemical Engineering Research (4).**

Investigation of a problem in chemical engineering or in industrial chemistry. Prerequisites: for problems in industrial chemistry, as in the statement above introductory to graduate courses; for investigation of a problem in chemical engineering, an undergraduate curriculum in chemical engineering substantially equivalent to the curriculum in this University. Deposit, \$30.00. First semester. Messrs. Theis, Simmons

**Ch.E. 281. Industrial Chemistry and Chemical Engineering Research (4).**

Continuation of Ch.E. 280. Deposit, \$30.00. Second semester. Messrs. Theis, Simmons

## CIVIL ENGINEERING

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### **Ch.E. 282. Chemical Engineering (3).**

Advanced consideration of chemical engineering energetics, hydrodynamics and heat transfer applied to filtration, classification, and extraction. Prerequisites: courses substantially equivalent to the undergraduate curriculum in this University. Given in alternate years. First semester.

Mr. Simmons

### **Ch.E. 283. Chemical Engineering (3).**

Continuation and amplification of Ch.E. 282, as applied to evaporation, refrigeration, and crystallization. Given in alternate years. Second semester.

Mr. Simmons

### **Ch.E. 284. Chemical Engineering (3).**

Continuation and amplification of Ch.E. 282 and 283, as applied to absorption and distillation. Given in alternate years. First semester.

Mr. Simmons

### **Ch.E. 285. Chemical Engineering (3).**

Continuation and amplification of Ch.E. 282 and 283, as applied to combustion, drying, hygrometry, and air conditioning. Given in alternate years. Second semester.

Mr. Simmons

### **Ch.E. 288. Chemical Engineering Process Design (3).**

The application of chemical engineering principles in the design of unit process equipment involving such processes as evaporation, distillation, drying, filtration, and absorption and the coordination of such units into organized production. Prerequisites: courses substantially equivalent to the undergraduate curriculum in chemical engineering in this University. Deposit, \$30.00. First semester.

Messrs. Theis, Simmons

### **Ch.E. 289. Chemical Engineering Process Design (3).**

Continuation of Ch.E. 288. Deposit, \$30.00. Second semester.

Messrs. Theis, Simmons

## CIVIL ENGINEERING

PROFESSOR SUTHERLAND

ASSOCIATE PROFESSORS FULLER, ENEY, AND PAYROW

ASSISTANT PROFESSORS UHLER, AND IPPEN

### **C.E. 1. Engineering Drawing (2).**

The use of drawing instruments; lettering and tracing; mechanical drawing of objects; simple projections; isometric drawings; principles of projection drawing. First semester.

### **C.E. 2. Engineering Drawing (2).**

Continuation of C.E. 1. Working drawings; applications of projection drawing. Prerequisite: C.E. 1. Second semester.

**C.E. 6. Land and Topographic Surveying (4).**

The theory and practice of land surveying, including computation of areas, dividing land; map drawing and topographic signs; field work with level and transit; theory and use of stadia. Prerequisites: *Plane trigonometry*; C.E. 1. Summer session: a recitation and seven hours of field work each week-day for four weeks. Not given during the war emergency.

**C.E. 6a. Land and Topographic Surveying (3).**

An abridgment of C.E. 6, given on the University campus during the war emergency. Prerequisites: *Plane Trigonometry*; C.E. 1. Summer and fall semesters.

**C.E. 8. Mechanics of Materials (4).**

The physical properties of structural materials; theory of beams, columns, and shafts. Prerequisites: *Math. 13*; *Math. 14*. First semester.

**C.E. 9. Mechanics of Materials (3).**

An abridgment of C.E. 8. Prerequisites: *Math. 13*; *Math. 14*. First and second semesters.

**C.E. 10. Materials Testing Laboratory (1).**

Experiments on wood, iron, and steel to determine the action of materials under stress and to study the physical properties of materials of construction. Prerequisites: *C.E. 8 or 9, previously or concurrently*. Fee, \$5.00. First and second semesters.

**C.E. 11. Railroad Engineering (3).**

Theory of curves and turnouts; preparation of profiles and maps; the computation of earth work and estimates of cost; the construction and maintenance of road-bed and of drainage structures. Prerequisites: C.E. 6 Second semester.

**C.E. 12. Hydraulics (3).**

Hydrostatics and theoretical hydraulics; the flow of water through orifices, weirs, tubes, pipes, and channels; hydraulic motors. Prerequisites: *Math. 13*; *Math. 14*. Second semester.

**C.E. 13. Hydraulics (2).**

An abridgment of C.E. 12. Prerequisites: *Math. 13*; *Math. 14*. Second semester.

**C.E. 14. Hydraulics Laboratory (1).**

Experiments in the measurement of water and the testing of hydraulic machinery. Prerequisites: *C.E. 12 or 13, or Chem. 78, previously or concurrently*. Fee, \$5.00. Second semester.

**C.E. 15. Structural Theory: Stresses (4).**

Algebraic and graphic determination of stresses in roof and bridge trusses under dead, live, and wind loads. Prerequisites: C.E. 8 or 9. Second semester.

**C.E. 15a. Structural Theory: Stresses (3).**

An abridgment of C.E. 15. Prerequisite: C.E. 8 or 9. Second semester.

**C.E. 16. Highway Engineering (3).**

The location, construction, and maintenance of roads and pavements; highway design. Prerequisite: C.E. 6. First semester.

**C.E. 16a. Highway Engineering (2).**

An abridgment of C.E. 16. Prerequisite: C.E. 6. First semester.

**C.E. 19. Advanced Mechanics of Materials (3).**

A continuation of C.E. 8. Stresses at a point, theories of failure, energy loads, dynamic stress effects, unsymmetrical bending, curved beams, torsional resistance of bars with non-circular cross-sections. Prerequisites: *Math. 14*; C.E. 8. Second semester.

**C.E. 29. Industrial Employment.**

During the summer following the junior year, students are required to spend at least eight weeks in shop work or on engineering construction, and are required to submit a written report.

**C.E. 30. Structural Design (3).**

Design of mine structures in steel and wood. An elective course for mining engineers. Prerequisite: C.E. 9. Second semester.

**C.E. 31. Route Surveying (2).**

Reconnaissance, preliminary, office, and field location methods; laying out curves, setting slope stakes; staking out drainage and other structures. One recitation and seven hours of field work each week-day for two weeks. Prerequisite: C.E. 6; C.E. 11. Summer session. Not given during the war emergency.

**C.E. 31a. Route Surveying (3).**

An extension of C.E. 31 given on the University campus during the war emergency. Prerequisites: C.E. 6a, C.E. 11. Spring and summer semesters.

**C.E. 32. Mechanics of Materials (3).**

A course somewhat more advanced in content than C.E. 9 with the inclusion of a number of tests of materials. Prerequisites: M.E. 4; *Math. 13*; Math. 14. Fee, \$2.50. First and second semesters.

**C.E. 33. Hydraulics (3).**

Two recitation periods per week devoted to the more important principles of theoretical hydraulics with practical applications, and a laboratory period given to the study of the flow of water through pipes, orifices, and turbines. Prerequisites: *Math. 13*; Math. 14. Fee, \$5.00. First semester.

**C.E. 35. Advanced Surveying (3).**

Adjustment of instruments; investigation of systematic and observational errors; elements of least squares with applications to surveying; adjustment of level nets and triangulation; solar and polar observations. Field work in triangulation, determination of azimuth, precise leveling, and with the plane table. Brief treatment of mine surveying and photogrammetry. Prerequisite: C.E. 6. First semester.

**C.E. 40. Engineering Conference.**

Required of seniors in the curriculum of civil engineering. Second semester.

**C.E. 41. Civil Engineering Proseminar (2).**

A study of current civil engineering projects and developments with written reports. At weekly meetings these reports are presented orally in abstract. Prerequisite: senior standing. Second semester.

**C.E. 41a. Civil Engineering Proseminar (1).**

An abridgment of C.E. 41. Prerequisite senior standing. Second semester.

**C.E. 50. Thesis (3).**

Thesis may be taken only by students of outstanding ability. Second semester.

**For Advanced Undergraduates and Graduates**

**C.E. 100. Engineering Valuation and Economy (3).**

The determination of probable life, earning power, and present worth of public and private industrial properties. Prerequisites: senior standing in engineering; Fin. 25; Acctg. 4 desirable either previously or concurrently. Second semester.

**C.E. 101. Foundations (2).**

Construction and design; elements of soil mechanics with applications to foundations. Prerequisites C.E. 8 or 9; Geol. 9. Second semester.

Mr. Fuller

**C.E. 118. Structural Theory (3).**

Study of the principles of design of structural members of wood and steel. Concurrent with C.E. 119. Prerequisite: C.E. 8; C.E. 15. First semester.

Messrs. Eney and Uhler

**C.E. 119. Structural Design (3).**

Application of the principles studied in C.E. 118 to the design both of individual structural members and certain complete structures, principally a plate girder bridge, a steel building frame, and a truss bridge. Prerequisite: concurrent with C.E. 118. First semester.

Messrs. Eney and Uhler

**C.E. 119a. Structural Design (1).**

An abbreviation of C.E. 119. Prerequisite: concurrent with C.E. 118.  
First semester. Messrs. Eney and Uhler

**C.E. 120. Structural Design (2).**

Wood construction. Prerequisite: C.E. 118. Second semester. Mr. Eney

**C.E. 124. Structural Theory (3).**

An introduction to the study of stresses in indeterminate structures.  
Prerequisite: C.E. 15. Second semester. Mr. Sutherland

**C.E. 125. Reinforced Concrete Design (3).**

Theory of reinforced concrete; design of reinforced concrete buildings,  
bridges and retaining walls. Prerequisites: C.E. 8 or 9; C.E. 15. First  
semester. Mr. Sutherland

**C.E. 126. Concrete Laboratory (1).**

The manufacture, properties, and testing of cement, mortar, and con-  
crete; tests on reinforced concrete beams and columns. Prerequisite: C.E.  
125. Fee, \$5.00. Second semester. Mr. Fuller

**C.E. 128. Sanitary Engineering (3).**

Fundamental principles of the design of water supply and sewerage  
systems and of water and sewage treatment plants. Prerequisites: C.E. 12  
or 13, or Chem. 78. First semester. Mr. Payrow

**C.E. 129. Sanitary Engineering Design (3).**

Continuation of C.E. 128. Detailed design of water and sewage sys-  
tems, including the complete design of a water and a sewage treatment  
plant. Prerequisite: C.E. 128. Second semester. Mr. Payrow

**C.E. 130. Sanitary Engineering Laboratory (1).**

Laboratory tests of water and sewage as applied to the operation of  
water and sewage plants. Visits of inspection are made to nearby water  
and sewage treatment plants. Prerequisite: C.E. 128. Second semester.  
Mr. Payrow

**C.E. 131. Advanced Sanitary Engineering (3).**

Engineering and public health; consideration of such matters as gar-  
bage and refuse collection and disposal, street cleaning methods, air  
conditioning, insect-borne diseases, rural sanitation, public health ad-  
ministration. Prerequisites: C.E. 128. Second semester. Mr. Payrow

**C.E. 132. Advanced Highway Engineering (3).**

Continuation of C.E. 16. A study of soil mechanics as related to sub-  
grade conditions and the stability of earth slopes. Prerequisites: C.E. 16;  
C.E. 8 and 12. Second semester. Mr. Becker

**C.E. 135. Structural Welding (1).**

The design of welded steel structures together with a study of current  
literature. A few periods will be devoted to the manual operation of

making welds. Prerequisite: senior standing in civil or mechanical engineering. Second semester.

**For Graduates**

The following courses are open to engineering graduates only. The prerequisite for any course listed is the undergraduate course of similar title. Math. 217 and 218, Theory of Elasticity, may be included in a graduate major as though given in the department of civil engineering.

**C.E. 201. Advanced Structural Theory (3).**

The design and investigation of statistically indeterminate structures of steel and reinforced concrete, including arches. First semester.

Mr. Sutherland

**C.E. 202. Advanced Structural Theory (3).**

Continuation of C.E. 201. Second semester. Mr. Sutherland

**C.E. 203. Plain and Reinforced Concrete (3).**

A critical review of recent research. Correlation of research with analysis and design. Given in alternate years. First semester.

**C.E. 206. Special Methods of Analysis (3).**

Analysis of complex stress distributions by the photoelastic and other methods. Prerequisite: C.E. 212. Given in alternate years. Second semester.

**C.E. 207. Sanitary and Hydraulic Engineering (3).**

The design of reservoirs, tanks, and pipe lines for water supply systems, and of sewers and other appurtenances for sewage systems. Inspection of existing plants, with reports thereon. First semester. Mr. Payrow

**C.E. 208. Sanitary and Hydraulic Engineering (3).**

Continuation of C.E. 207. Second semester. Mr. Payrow

**C.E. 209. Structural Seminar (3).**

Study of current discussion in the field of structural theory and design. First semester. Messrs. Sutherland, Ippen

**C.E. 210. Structural Seminar (3).**

Continuation of C.E. 209. Second semester. Messrs. Sutherland, Ippen

**C.E. 212. Research Methods (3).**

Study of principles of research as applied to engineering materials; measuring instruments, testing machines. First semester.

**C.E. 213. Structural Research (2 to 5).**

Individual research problems with reports. First or second semester.

**C.E. 214. Mechanical Methods of Stress Determination (3).**

Use of mechanical devices in investigation of special problems such as temperature deformations, foundation displacements and integral action

ECONOMICS AND SOCIOLOGY

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of structures; theory of similitude. Given in alternate years. Second semester. Mr. Eney

**C.E. 215. Structural Members and Frames (3).**

Analysis and design problems in bending and elastic stability. Given in alternate years. Not given in 1942-43. First semester.

**C.E. 216. Plate and Shell Structures (3).**

Analysis and design problems in bending and elastic stability. Given in alternate years. Not given in 1942-43. Second semester.

**C.E. 217. Foundation Engineering (3).**

Physical properties of soils; soil testing for foundation purposes, applications to theory and design. First or second semester.

**C.E. 219. Structural Welding (3).**

Continuous and non-continuous construction with welded connections; distortion effects; current research. Given in alternate years. Second semester.

**C.E. 231. Hydrodynamics (3).**

Fundamentals of fluid motion; flow phenomena in closed and open channel; advanced practical problems. First semester. Mr. Ippen

**C.E. 232. Run-off and Stream-Flow (2).**

Hydrologic studies. Soil conservation, flood prevention and control, hydraulic structures. First semester. Mr. Ippen

**C.E. 233. Hydraulic Laboratory Practice (2).**

Study of theory and methods of hydraulic experimentation simultaneously with laboratory work. Second semester. Mr. Ippen

**C.E. 235. Hydraulic Research (2 to 5).**

Individual research problems with reports. First and second semesters. Mr. Ippen

**ECONOMIC STATISTICS**

See Accounting

**ECONOMICS AND SOCIOLOGY**

PROFESSOR DIAMOND  
DEAN CAROTHERS

**ECONOMICS**

**Eco. 1. Industrial Evolution (3).**

An introductory course outlining the gradual development of economic organization with special attention to the stages of economic progress and social institutions growing out of these stages. First semester.

**Eco. 3. Economics (3).**

A general course in the principles of economics, covering the fundamental forces governing the production, distribution, and consumption of wealth, with emphasis on value, exchange, money, rent, interest, profits, and wages. Prerequisite: sophomore standing. First semester.

**Eco. 4. Economics (3).**

Continuation of Eco. 3. Prerequisite: Eco. 3. Second semester.

**Eco. 11. Marketing (3).**

A detailed and critical analysis of the principles of marketing. Designed to acquaint the student with major institutions and functions involved in the distribution of goods and services from the producer to the consumer. Primary prerequisite: Eco. 4. First semester.

**Eco. 15. Retailing (3).**

A study of modern retail institutions. Principles and methods of retail organization and management. Economic, social, and legislative aspects of the retailing structure. Primary prerequisite: Eco. 4. Secondary prerequisite: Eco. 11. Second semester.

**Eco. 50. Economic Geography (3).**

A survey of world resources and world trade, with special reference to the chief economic materials and the geographic and economic factors responsible for the position of the United States in the economic world. Second semester.

**Eco. 60. Insurance (3).**

A non-mathematical course in the economic principles and business practice of insurance, particularly life, fire, and casualty insurance. Prerequisite: Eco. 4. First semester.

**For Advanced Undergraduates and Graduates**

**Eco. 107. Advanced Economics (3).**

An advanced course in the principles of economics, dealing especially with the theory of the distribution of wealth, the nature of the productive process, the history of economic doctrines, and proposed plans of economic reform such as socialism. Prerequisite: *Eco. 4*. First semester.

Mr. Diamond

**Eco. 108. Advanced Economics (3).**

Continuation of Eco. 107. Prerequisite: *Eco. 4*. Second semester.

Mr. Diamond

**Eco. 113. Advertising (3).**

The principles, practices, and problems of advertising with special reference to its social and economic aspects. Prerequisite: *Eco. 4*; *Eco. 11*. First semester.

**Eco. 114. Selling and Sales Management (3).**

The principles and practices of modern selling and sales management. The function of distribution in modern management. Prerequisite: *Eco. 4*; *Eco. 11*. Second semester.

ECONOMICS AND SOCIOLOGY

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**Eco. 133. Labor Problems (3).**

The economics of labor, the history of labor movements in the United States, forms of labor organizations, and the method and policies of trade unions. Prerequisite: *Eco. 4.* First semester. Mr. Diamond

**Eco. 134. Labor Problems (3).**

A continuation of Eco. 133. The relations of labor to the courts; social legislation. Unemployment, employee health, accidents, personnel work, and employee representation. Prerequisite: *Eco. 4;* *Eco. 133.* Second semester. Mr. Diamond

**Eco. 171. Readings in Economics (3).**

Readings in various fields of economics, designed for the student who has a special interest in some field of economics not covered by the regularly rostered courses. Prerequisites: senior standing and consent of the head of the department. First semester. Mr. Diamond

**Eco. 172. Readings in Economics (3).**

Continuation of Eco. 171. Prerequisites: senior standing and consent of the head of the department. Second semester. Mr. Diamond

SOCIOLOGY

**Soc. 51. Social Institutions (3).**

A one-semester course outlining the fundamental institutions of the social order, with special reference to their origin, growth, and present interrelations. Prerequisite: *Eco. 4.* First semester.

**For Advanced Undergraduates and Graduates**

**Soc. 161. Sociology (3).**

The nature and the growth of social institutions, with emphasis on evolution, racial developments, social stratification, and the social problems connected with the institutions of private property, family organization, and sex. Prerequisite: *Eco. 4.* First semester. Mr. Diamond

**Soc. 162. Social Problems (3).**

Special problems of contemporary society, including population trends, crime, public health, poverty, child welfare, the handicapped, etc. Prerequisite: *Eco. 4.* Second semester. Mr. Diamond

**Soc. 171. Readings in Sociology (3).**

Readings in various fields of sociology, designed for the student who has a special interest in some field of sociology not covered by the regularly rostered courses. Prerequisites: senior standing and consent of the head of the department. First semester. Mr. Diamond

**Soc. 172. Readings in Sociology (3).**

Continuation of Soc. 171. Prerequisite: senior standing and consent of the head of the department. Second semester. Mr. Diamond

## EDUCATION

PROFESSOR CONGDON

ASSOCIATE PROFESSOR F. C. BECKER  
MESSRS. HAYWARD, LARAMY, JONES, AND MILLER

Attention is also called to the statement concerning preparation for teaching in the description of the College of Arts and Science.

### **Educ. 0. Effective Study Methods.**

A practical course in study techniques and in the tools of study, including reading and fundamentals of mathematics, as the needs of individual students may require. An extensive testing program is carried on to assist the student in adjusting himself. Prerequisite: *consent of the instructor*. Not given in 1944-45. Second half of first semester. No credit toward graduation.

### **Educ. A. Effective Study Methods (3).**

A continuation of Educ. 0. Prerequisite: Educ. 0. Not given in 1944-45. Second semester.

### **Educ. 1. Introduction to Education (3).**

A general introduction to the field of education, giving a broad survey of the work of the teacher and of the public schools. Required for the college provisional certificate. Should be taken during the junior year or earlier. First and second semesters.

### **Educ. 20. Educational Psychology (3).**

An introductory course furnishing a psychological foundation immediately related to educational problems and practice. Practical problems involving analysis of designated material are assigned regularly for solution and report. Required for the college provisional certificate. Should be taken during the junior year. Prerequisite: *Psych. 1*. Second semester.

### **Educ. 51. Principles of High School Teaching (3).**

Basic methods of secondary instruction, including the objectives of education in relation to the curriculum; socialized procedure; problem-project method; contract plans; types of teaching related to different fields; directed study; organization of courses around criticized objectives and the conduct of classes along the lines of individualized instruction. Recommended for the college provisional certificate. Should be taken with Educ. 53. Prerequisites: Educ. 1 and 20. First semester.

### **Educ. 53. Observation of Secondary School Teaching (3).**

Study, directed observation, and discussion of the various phases of teaching activity in high schools in or near Bethlehem. The class meets two hours each week. In addition, detailed reports are required for sixty observation periods. Required for the college provisional certificate. Prerequisites: Educ. 1 and 20; Educ. 51 concurrently. Not given in 1944-45. First semester.

**Educ. 54. Practice Teaching of Secondary School Subjects (3).**

An intensive practical application of the principles of teaching to classroom conditions. The class meets two hours each week, in sections according to major interests, for the study of teaching procedure, actual organization, and planning of courses around definite objectives. A minimum of sixty periods of acceptable supervised practice in classroom instruction is required. Students must have at least one free hour at the same time each day throughout the week. Required for college provisional certificate. Prerequisite: *Educ. 53 and fifteen semester hours in each subject the candidate expects to teach.* Not given in 1944-45. Second semester.

**Educ. 56. Practice Teaching of Secondary School Subjects (3).**

A continuation of Educ. 54 required of students who desire certification in New Jersey. Teaching must be done in a field for which practice teaching credit has not previously been granted. Prerequisite: *Educ. 53 and fifteen semester hours in the subject the candidate expects to teach.* Educ. 54 may be taken concurrently. Not given in 1944-45. Second semester.

**For Advanced Undergraduates and Graduates**

**Educ. 121. The Diagnosis and Adjustment of Reading Difficulties (3).**

The psychology of reading as related to learning difficulties. The fundamental skills of reading, including eye movements, the measurement and diagnosis of reading difficulties, and recent experiments with remedial procedure. Practice in the development of material for remedial instruction. Prerequisite: *consent of the instructor.* First or second semester.

Mr. Hayward

**Educ. 130. History of Education in Europe (3).**

A survey of the Greek, Roman, and early Christian periods; late medieval and early modern periods; European movements since the French Revolution and their implications for American education. Second semester.

Mr. Becker

**Educ. 131. History of Education in the United States (3).**

The development of primary, secondary, and higher education in the United States. The aims, curricula, methods, and systems of education, through five periods from Colonial times to the present, in relation to the social conditions and processes. Prerequisite: junior standing. First semester.

Mr. Becker

**Educ. 150. Principles of Secondary Education (3).**

The aims, organizations, and materials of secondary education, characteristics of secondary school pupils, and a general treatment of the problems of secondary education. An introductory course in the field of secondary education. Recommended for the college provisional certificate. Prerequisite: consent of the instructor. Second semester.

Mr. Congdon

**Educ. 151. Organization of Materials of Instruction (3).**

A practical course for the teacher in service offering opportunity for cooperative planning of courses and units of instruction. Applying the principles of curriculum construction to the selecting, assembling, and organizing of materials of instruction. The teacher is expected to work in his field of special interest. Prerequisite: *consent of the instructor*. First semester.

**Educ. 171. Elementary Educational Statistics (3).**

Designed to give teachers and administrative officers the techniques necessary to enable them to gather data and present the results of their work in their classrooms and schools. Provides a practical knowledge of the simpler statistical methods for use in handling common problems and in understanding educational literature. Prerequisite: *consent of the instructor*. First semester.

**Educ. 173. Diagnostic and Remedial Teaching (3).**

The analysis and treatment of difficulties in the various subjects. The student may select any academic subject, in which he has adequate background, as his field of work. Practice is given in the development of materials, and actual work with failing pupils is expected. Prerequisite: *consent of the instructor*. Summer session.

Mr. Hayward

**Educ. 190. Visual Instruction (3).**

Types of visual aids, the special value of each, their use in different subjects, the psychological basis for the use of such material and the standards for the selection of visual sensory aids. Required for the permanent college certificate. May be completed as an undergraduate course or may be completed after graduation before application is made for the permanent college certificate. Second semester.

For courses in special methods, see Lat. 109 and 110, in the department of Latin.

**For Graduates**

The major in education on the graduate level is intended for students preparing for school administration and supervision and for other types of public school positions. Preparation is offered for such positions as Superintendent of Schools, Supervising Principal, Elementary Principal, Secondary Principal, and Vocational Counsellor. All work is approved by the State Councils of Education of Pennsylvania and New Jersey.

At least four semester courses in education are prerequisite for a graduate major in this field. The prerequisites may be taken concurrently with a partial major program. Attention is called to Educ. 121, 130, 131, 150, 151, 171, 173, and 190, all of which are

open to advanced undergraduates and graduate students, and which may be accepted toward a major or as collateral work in education.

**Educ. 219. Social Policy and Education (3).**

A critique of the aims of education in the modern social order. The nature, needs, and adjustments of modern industrial society; the conflicting demands upon education by a changing civilization as represented by modern social points of view; the implications, for education, of contemporary American philosophy of democratic social progress. Prerequisite: consent of the instructor. First semester. Mr. Congdon

**Educ. 220. Advanced Educational Psychology (3).**

Study and practice of techniques and methods involved in making a detailed psychological analysis of the pupil, particularly in relation to school problems. Prerequisite: consent of the instructor. Not given in 1944-45. Second semester.

**Educ. 222. Education of Exceptional Children (3).**

Methods of instruction and provision of materials for children who differ markedly from the normal, i.e., gifted, subnormal, and maladjusted. The problems of the teacher in a system that makes little provision for the exceptional child. Actual case studies of pupils are required. Prerequisite: consent of the instructor. Second semester.

**Educ. 223. Psychology of School Subjects (3).**

An analysis of the psychological development and behavior of pupils in connection with school subjects at all levels. Diagnostic work. Each student has an opportunity to emphasize the subject of his special interest. Summer session. Mr. Hayward

**Educ. 243. Elementary School Administration (3).**

The major problems of organization and administration of elementary schools. Types of organization, pupil promotion, time allotment, service agencies, and plant and equipment. Required for a principal's certificate. Second semester.

**Educ. 244. The Elementary School Curriculum (3).**

Problems of curriculum development in the first six grades; subject matter placement, program making for different types of schools, regular vs. special subjects, articulation, and similar problems. First semester.

**Educ. 246. Elementary School Supervision (3).**

Methods, materials, organization, and evaluation of supervision. Each student will be required to develop a supervisory program for a subject or a school. Second semester.

**Educ. 253. Secondary School Administration (3).**

The major problems of organization and administration of secondary schools: program of studies, teaching staff, pupil personnel, plant and

equipment, and community relationships. Required for a principal's certificate. Prerequisite: *Educ. 150 or its equivalent.* First semester.

**Educ. 254. The Secondary School Curriculum (3).**

Related to Educ. 253, but organized in such a way that it may be taken independently. Methods of study of curriculum problems, the selection of subject matter in various fields, the principles of program construction, and similar problems. Prerequisite: *Educ. 150 or its equivalent.* Second semester.

**Educ. 256. Supervision in Secondary Schools (3).**

Related to Educ. 253 and 254, but may be taken independently. The purpose of supervision, a program for the improvement of teaching, the evaluation of teaching, measurement, supervisory relationships, and similar problems involved in the supervision of instruction in secondary schools. Prerequisite: *Educ. 150 or its equivalent.* Second semester.

**Educ. 257. Modern Trends in Teaching (3).**

Designed for the teacher in service and for principals who wish a knowledge of the most recent developments in the trends and techniques of teaching. Special attention is given to experimental studies in the field of method. Prerequisite: *consent of the instructor.* First semester. Mr. Lee

**Educ. 263. Public School Administration (3).**

A systematic treatment of the problems of administration, local, state, and national. The newer developments which are modifying educational administration: state authorization and organization, the board of education, the superintendent of schools, personnel management, business administration, financial support, and public relations. First semester.

Mr. Congdon

**Educ. 264. Foundations of Curriculum Construction (3).**

Principles of curriculum construction which underlie the reorganization of the program of studies for elementary and secondary schools. Consideration of the origin and background of the curriculum, methods of organization, state, county, and city programs, curriculum planning and development, techniques for developing materials, and similar pertinent topics. First semester.

**Educ. 266. Supervision of Instruction (3).**

Analysis of the principles underlying the organization and supervision of instruction. Applications to specific teaching situations. No lines will be drawn between the elementary and the secondary school. Summer session.

Mr. Hayward

**Educ. 272. Educational Tests and Measurements (3).**

Selection of educational tests, organization of a testing program, use of tests in classification, construction of classroom tests, use of tests in improving teaching, and diagnosis of pupil difficulties. For advanced work in this field attention is called to the seminar and individual research courses. Not given in 1943-44. Second semester.

## ELECTRICAL ENGINEERING

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### **Educ. 282. Educational and Vocational Guidance (3).**

General principles of guidance. Discovery of interests and abilities, study of occupations, study of educational opportunities, guidance activities, group programs, student personnel problems. Current practices are carefully examined. Required for guidance certificates. For advanced work in this field attention is called to the seminar and individual research courses. Second semester.

### **Educ. 291-292. Seminars (3).**

One seminar is organized in each half year provided three or more students select such work. These courses do not duplicate the courses of individual research. It is the purpose of seminar courses to provide for co-operative study of special problems in the field of elementary and secondary education. Prerequisite: *consent of the instructor*. First and second semesters. Messrs. Congdon, Hayward

### **Educ. 293-294. Individual Instruction, Field Work, or Research (3).**

Open to students with appropriate preparation and needs for pursuing independent investigation. The student must have shown interest and capacity for advanced work in the chosen field evidenced in part by an approved plan of work. Prerequisite: *consent of the instructor*. First and second semesters. Messrs. Congdon, Hayward

### **Educ. 295-296. Seminar in School Administration (3).**

Cooperative study of special problems in the field of school administration. Appropriate problems include: finance, building programs, business management, and school law. Prerequisite: *consent of the instructor*. First and second semesters. Mr. Congdon

## ELECTRICAL ENGINEERING

PROFESSOR BEAVER  
ASSOCIATE PROFESSORS A. R. MILLER AND BRENNCKE  
ASSISTANT PROFESSOR GRUBER

### **E.E. 23. Thesis for Degree of B.S. in Electrical Engineering (3).**

Independent work in theory, experimental research, or designing, with frequent reports of progress, supplemented by reference reading. The subject of the thesis is to be chosen in the first semester though the work upon which it is based may be done in either semester. Prerequisite: senior standing. First or second semester.

### **E.E. 32a. Direct Current Machinery (3).**

Direct current circuits; magnetic circuits; direct current machine construction, operation, and control; generated voltages, forces on conductors, armature windings, machine characteristics. Prerequisites: *Phys. 24, Math. 13*; *Math. 14* concurrently. Second semester.

**E.E. 33a. Direct Current Laboratory (1).**

A coordinated laboratory course supplementing the classroom work in E.E. 32a. Experimental studies and tests of direct-current machines and appliances, including characteristics, regulations, efficiency, etc. Fee, \$6.00. Prerequisite: *E.E. 32a, concurrently*. Second semester.

**E.E. 34. Alternating Current Circuits (3).**

Alternating current conceptions; laws for series and parallel circuits containing R, L, and C; vector methods; complex quantities; single and polyphase circuits and networks; power; Fourier Series; harmonics; superposition. Prerequisites: *E.E. 32 or E.E. 50, Math. 14; Math. 106 concurrently*. First semester.

**E.E. 35. Alternating Current Circuits Laboratory (1).**

Supplements E.E. 34. Alternating current circuit experiments, with oscillographic studies. Fee, \$6.00. Prerequisite: *E.E. 34 concurrently*. First semester.

**E.E. 36. Alternating Current Machines (3).**

The electrical, magnetic, and mechanical features of single and polyphase transformers and induction motors. Prerequisites: *E.E. 34, E.E. 37 concurrently*. Second semester.

**E.E. 37. Alternating Current Machine Laboratory (2).**

Supplements E.E. 36. Laboratory tests on transformers, transformer banks and induction motors. Fee, \$12.00. Prerequisite: *E.E. 36 concurrently*. Second semester.

**E.E. 38. Alternating Current Machines (3).**

A continuation of E.E. 36. Treats the electrical, magnetic, and mechanical features of synchronous generators, motors, and converters. Parallel operation. Prerequisites: *E.E. 36; E.E. 39 concurrently*. First semester.

**E.E. 39. Alternating Current Machine Laboratory (2).**

A continuation of E.E. 37, supplementing E.E. 38. Laboratory tests on synchronous generators, motors, and converters. Measurement of constants, parallel operation, calculations. Fee, \$12.00. Prerequisite: *E.E. 38 concurrently*. First semester.

**E.E. 40. Electronic Devices (3).**

A study of the fundamentals of electronic discharges in vacua and gases, operating characteristics of vacuum and gaseous tubes, mercury arc rectifiers, photoelectric cells, cathode ray oscillographs, etc.; emphasis on application of electronic devices in industry. Prerequisite: *E.E. 34*. Second semester.

**E.E. 50. Dynamos and Motors, General (2).**

The principles and practice of direct-current engineering, including the elementary theory, construction, operation, and control of direct-current generators and motors, electromagnets, solenoids; illustrative problems. A one-semester course designed for non-electrical engineers. Prerequisites: *Math. 13, Phys. 24*. First and second semesters.

**E.E. 51. Dynamo Laboratory, Beginning (1).**

Introductory course supplementing the class work of E.E. 50. Experimental studies and tests of direct-current generators and motors for characteristics, regulations, efficiency, etc. Prerequisite: *E.E. 50 concurrently*. Fee, \$6.00. First and second semesters.

**E.E. 52. Alternating Currents, General (2).**

Continuation of E.E. 50; the principles and practice of alternating-current engineering; the theory of alternating currents with applications to alternating-current generators, motors, transformers, and other apparatus; systems of transmission and distribution. Prerequisite: E.E. 50. First and second semesters.

**E.E. 53. Dynamo Laboratory, Intermediate (1).**

Continuation of E.E. 51, supplementing the class work of E.E. 52 and 54. Advanced testing of direct-current machines; practice in operating and testing alternating-current apparatus. Prerequisites *E.E. 51; E.E. 52 concurrently*. Fee, \$6.00. First and second semesters.

**E.E. 54. Electrical Engineering, Applications (2).**

Systems of generation, transmission, distribution, and utilization taken up in order, under utilization special attention given to the application of electric motors to various industries; estimates and costs; problems. Particularly adapted to students who do not specialize further along electrical lines. Prerequisites: *E.E. 50; E.E. 52 concurrently*. Second semester.

**E.E. 55. Dynamo Laboratory, Advanced (1).**

Continuation of E.E. 53, consisting of advanced direct- and alternating-current studies and tests. Primarily for non-electrical students taking more than the usual two semesters of dynamo laboratory. Prerequisites: *E.E. 53, E.E. 54 concurrently*. Fee, \$6.00. Second semester.

**E.E. 58. Electrical Machinery (3).**

A short course covering the theory and application of direct- and alternating-current apparatus adapted to students requiring a minimum of electrical engineering, including: direct-current and alternating-current circuit theory, construction and operation of electrical machinery. Prerequisites: *Math. 13, Phys. 24 concurrently*. First or second semester.

**E.E. 59. Dynamo Laboratory, Combined (1).**

A brief course covering the simpler tests on direct- and alternating-current circuits and apparatus. Prerequisite: *E.E. 58 previously or concurrently.* Fee, \$6.00. First or second semester.

**For Advanced Undergraduates and Graduates**

**E.E. 101. Electric Power Stations (3).**

Hydro stations; steam stations; prime movers; auxiliary equipment; bus systems; cables; switch gear; circuit breakers; switchboards; measuring and protective devices; layout and design; operation and management; plant economics and rate making; visits to neighboring plants. Prerequisites: *E.E. 38 concurrently.* First semester. Mr. Beaver

**E.E. 102. Distribution Systems (3).**

Substations; D.C. and A.C. networks; residential and industrial power distribution; relays; protective devices; short-circuit calculations; economics of distribution. Prerequisite: *E.E. 101.* Second semester. Mr. Beaver

**E.E. 103. Industrial Applications (3).**

Motor characteristics; load characteristics; control devices; conversion apparatus; power factor correction; the principles of motor application, with specific examples; application of electronic devices; electric transportation. Prerequisite: *E.S. 38 concurrently.* First semester. Mr. Brennecke

**E.E. 106. Illumination Engineering (3).**

A study of the principles involved in the production and utilization of light from artificial sources. The spectroradiometric curve; the visibility function; photometric methods, units, and standards; incandescent, gaseous-conduction, and fluorescent sources; design of indoor and outdoor lighting installations. Prerequisites: *E.E. 34, E.E. 50 or E.E. 58.* Second semester. Mr. Brennecke

**E.E. 117. Electrical Engineering Proseminar (1).**

A weekly meeting for discussion of topics from the current journals of theoretical and applied electricity. Presentation of papers on assigned topics. Prequisites: *E.E. 36, E.E. 37;* senior standing. First semester.

**E.E. 118. Electrical Engineering Proseminar (1).**

Continuation of E.E. 117. Prerequisite: *E.E. 117.* Second semester.

**E.E. 131. Electric and Magnetic Fields (3).**

The calculation and construction of electric and magnetic fields for conductors, plates, vacuum tubes, slots, teeth, etc.; analogous problems in fluid flow. The methods of the theory of functions of a complex variable and of Fourier series and integrals are introduced in sufficient detail to serve in the analytical work; the rules for free hand plotting are derived and applied. Prerequisites: *Math. 106; E.E. 38 concurrently.* First semester.

**E.E. 132. Electric Transients (3).**

Electrical, mechanical, and heat flow transients of circuits, transmission lines, electrical machinery, and power systems. Operational calculus, to include Fourier integral, Bromwich integral, Laplacian transform, and the direct operational method. Prerequisites: *Math. 106; E.E. 131*. Second semester.

**E.E. 133. Transmission Lines (3).**

Long distance transmission of power; determination of line constants; geometric mean distances; corona; interference; differential equations and solutions; general circuit constants; regulation; losses and efficiency; mechanical design of lines; economics of power transmission. Prerequisites: *Math. 106, E.E. 38 concurrently*. First semester. Mr. Miller

**E.E. 134. Transmission Line Transients (3).**

Traveling waves; free and forced oscillations; reflections; transition points; multi-conductor systems; multi-velocity waves; attenuation and distortion; lightning surges; switching surges; arcing grounds; protective devices. Surges in transformer and machine windings. Prerequisites: *E.E. 133, E.E. 132 concurrently*. Second semester. Mr. Miller

**E.E. 135. Symmetrical Components (3).**

The solution of unbalanced polyphase circuits by means of symmetrical components; system faults, open-circuit and short-circuit current and voltage calculations; sequence impedances of transmission lines, transformer banks, etc.; metering. Prerequisites: *E.E. 38 concurrently, E.E. 39 concurrently*. First semester. Mr. Miller

**E.E. 136. System Stability (2).**

Steady state and transient power limits of transmission systems. Electro-mechanical characteristics of electrical machines and networks. Prerequisites: *E.E. 135, E.E. 137 and E.E. 138 concurrently*. Second semester. Mr. Miller

**E.E. 137. Advanced Machine Theory (3).**

The transient theory of A-C machines. Balanced and unbalanced conditions; time constants. Approximate and rigorous solutions. Prerequisites: *E.E. 135, E.E. 132 and E.E. 138 concurrently*. Second semester. Mr. Miller

**E.E. 138. Transients Laboratory (1).**

An oscillographic laboratory study of transmission line transients, system stability, and machine transients. Prerequisites: *E.E. 134 concurrently, E.E. 136 concurrently, E.E. 137 concurrently*. Fee, \$6.00. Second semester.

**E.E. 141. Radio Communication (3).**

The principles of radio communication. A study of high frequency alternating currents, resonant circuits, and amplifier circuits. Laboratory measurements on audio and radio circuits. Prerequisite: *E.E. 40*. Fee, \$6.00. First semester.

**E.E. 142. Radio Communication (2).**

Continuation of E.E. 141. A study of detection, oscillation, amplitude and frequency modulation, and television. Prerequisite: *E.E. 141*. Second semester.

**E.E. 143. Wire Communication (3).**

Introductory theory of networks. Bridge and coupled circuits; impedance matching; telephone circuits; transmission lines at audio and carrier frequencies. Communication apparatus. Prerequisite: *E.E. 40*. First semester.

Mr. Brennecke

**E.E. 144. Wire Communication (3).**

Continuation of E.E. 143. Wave filters, repeaters, corrective and balancing networks. Electro-acoustics. Laboratory measurements on wire communication circuits. Fee, \$6.00. Prerequisite: *E.E. 143*. Second semester.

Mr. Brennecke

**E.E. 146. Ultra-High-Frequency Techniques (4).**

Power rectification, amplification, oscillation, cathode-ray tubes and circuits, modulation, demodulation, receivers, transmitters, ultra-high-frequency generators, radio frequency transmission lines, radiation, propagation and wave guides. One laboratory and three class periods per week. Prerequisites: *E.E. 141, E.E. 143*. Fee, \$6.00. Second semester.

**For Graduates**

For graduate students intending to take their major subjects in electrical engineering, a preparation equivalent to the work required for the B.S. in E.E. degree is necessary.

Graduate courses are given to qualified men from the industries of the surrounding district.

**E.E. 203. Electrical Design (3).**

Predetermination by calculation of the characteristics, regulation, and performance of electrical machinery. Analysis and use of design constants. Design of special machines. First semester.

Mr. Beaver

**E.E. 204. Electrical Design (3).**

Continuation of E.E. 203. Second semester.

Mr. Beaver

**E.E. 215. Gaseous Conductors.**

A study of the electric and kinetic theory of gases including mean free paths, ionization, recombination, diffusion, scattering, mobility and space potential distributions. The theory of the spark, glow, and arc. First semester.

**E.E. 216. Gaseous Conductors.**

Continuation of E.E. 215 correlated with industrial problems. Second semester.

E N G L I S H

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**E.E. 217. The Economics of Electric Power (3).**

A treatment of economic principles as applied to the design, selection, and use of electrical apparatus, plants, and systems; the adjustment of fixed charges and operating expenses by the application of Kelvin's Law to problems of generation, transmission, conversion, distribution, and utilization of electric power. First semester. Mr. Beaver

**E.E. 218. The Economics of Electric Power (3).**

Continuation of E.E. 217. Second semester. Mr. Beaver

**E.E. 219. Theory of Networks (3).**

Consideration of electrical networks from a general standpoint. Characteristics of two and four terminal networks. Foster's, Cauer's and Bartlett's theorems. Transformations by matrix manipulation. Theory of long lines. First semester. Mr. Brennecke

**E.E. 220. Theory of Networks (3).**

Continuation of E.E. 219. Advanced theory of wave filters. Simulative and corrective networks. Transient behavior of long lines and filters. Second semester. Mr. Brennecke

**E.E. 221. Electro-Acoustics (3).**

The principles and apparatus involved in the generation, transmission, and reproduction of sound by electrical means; a study of acoustical lines and filters, acoustical measurements, sound re-enforcing systems, supersonics. Prerequisite: E.E. 142 or its equivalent. First semester.

Mr. Brennecke

**E.E. 222. Electro-Acoustics (3).**

Continuation of E.E. 221. Second semester.

ENGLISH

PROFESSORS SMITH AND SEVERS

ASSOCIATE PROFESSORS RILEY AND CLIFFORD

ASSISTANT PROFESSORS STRAUCH, CHRISTENSEN, AND RIGHTS

The freshmen are distributed, upon the basis of preliminary tests given during freshman week, into three groups: low, Engl. 0; middle, Engl. 1; high, Engl. 3a.

Engl. 1 and 2 constitute the minimum freshman requirement. Since no college credit is given for Engl. 0, students in the low group are required to take Engl. 2 either in summer session or during the second year, in order to complete the six required hours. A student whose work shows that he has been placed in the wrong group may be transferred to the higher or to the lower group at any time during the year, if his instructor recommends and the head of the department approves the transfer.

**Engl. 0. Elementary Composition (0).**

Drill in fundamentals of English grammar and in the mechanics of writing. First and second semesters.

**Engl. 1. Composition and Literature (3).**

A rapid review of functional grammar and of sentence and paragraph structure. Practice in outlining and original composition. Readings in expository prose. First and second semesters.

**Engl. 2. Composition and Literature (3).**

Continuation of Engl. 1. Practice in expository writing, including documental papers and reports. First and second semesters.

**Engl. 3a. Types of World Literature (3).**

A study of the masterpieces of world literature. Written and oral reports. Required of freshmen in the high group. First semester.

**Engl. 3b. Types of World Literature (3).**

Continuation of Engl. 3a. Second semester.

**ENGLISH LITERATURE AND COMPOSITION**

Students wishing to major in English literature should take as preliminary work either Engl. 3a, 3b, or 4, 5, 8, 9, or such equivalent courses as may be recommended by the head of the department. They should then elect two English courses in each semester of the junior year and at least two in each semester of the senior year. Students working for honors take a seminar course in which they prepare a thesis as part of the honors requirement.

**Engl. 4. A Study of the Drama (3).**

Reading and critical study of types of drama; theories of the drama; the drama and the stage; the drama as a criticism of life. Prerequisites: Engl. 1 and 2. First semester.

**Engl. 5. A Study of the Drama (3).**

Continuation of Engl. 4. Prerequisites: Engl. 1 and 2. Second semester.

**Engl. 8. English Literature (3).**

A survey of English literature from *Beowulf* through the Pre-romantics, with selected readings. Prerequisites: Engl. 1 and 2. First semester.

**Engl. 9. English Literature (3).**

A survey of English literature from Wordsworth to Housman. Prerequisites: Engl. 1 and 2. Second semester.

**Engl. 18. The Novel (3).**

A study of the types of the novel. Reading and reports. Lectures on the history of the novel in England and America. Prerequisites: Engl. 1 and 2. First semester.

**Engl. 19. The Novel (3).**

Continuation of Engl. 18. Prerequisites: Engl. 1 and 2. Second semester.

**Engl. 20. American Literature, 1607-1855 (3).**

A survey of the major writers from the settlement of America to the Civil War, including Franklin, Paine, Bryant, Emerson, Thoreau, Longfellow, Whittier, Poe, Holmes, Lowell, Irving, and Melville. Lectures and class discussions. Prerequisites: Engl. 1 and 2. First semester.

**Engl. 21. Modern American Literature (3).**

A study of the development of American literature from Whitman to the present day. Lectures and class discussions. Prerequisites: Engl. 1 and 2. Second semester.

**Engl. 41 Business Letters (3).**

Rhetorical and psychological principles and forms in modern business communication. Practice in writing letters of inquiry, request, reply, acknowledgement, adjustment, credit, collection, sales and application. Prerequisites: Engl. 1 and 2. First and second semesters.

**Engl. 42. Technical Writing (3).**

Study and practice in forms and methods of technical exposition, description, definition, classification; the technical report, abstract, editorial, and book review; the semipopular article. Prerequisites: Engl. 1 and 2. Second semester.

**Engl. 81. Undergraduate Thesis (3).**

Open to advanced undergraduates who wish to submit theses in English First semester.

**Engl. 82. Undergraduate Thesis (3).**

Continuation of Engl. 81. Second semester.

**Engl. 83. Readings in English Literature (3).**

Open to advanced students who wish to pursue special courses of readings in English Literature. First semester.

**Engl. 84. Readings in English Literature (3).**

Continuation of Engl. 83. Second semester.

**For Advanced Undergraduates and Graduates**

The courses in this group are open to students of junior standing.

**Engl. 117. Contemporary Drama (3).**

Types of the drama.

Mr. Christensen

**Engl. 118. American Literature (3).**

Movements that have shaped American thought and feeling as expressed in the national literature: Puritanism, Americanism, Romanticism, Transcendentalism, Individualism, the Civil War, Democracy, the West, Realism, Internationalism, and Skepticism, as presented by Jonathan Edwards, Franklin, Paine, Longfellow, Poe, Emerson, Thoreau, Mark Twain, Henry James, and Henry Adams. Summer session. Mr. Strauch

**Engl. 120. The Novel (3).**

The great masterpieces of prose fiction produced in England, in America, and on the Continent during the nineteenth and twentieth centuries. Development of types of the novel. The theory and technique of the novel. Summer session. Mr. Riley

**Engl. 121. Contemporary Literature (3).**

Present-day American literature. Collateral readings and reports. Book fee, \$2.50. Prerequisites: six hours chosen from Engl. 3a, 3b; 4, 5, 6, 7; 8, 9; 18, 19; 20, 21, or from any of the courses in the 100 or 200 group. First semester. Messrs. Riley, Strauch

**Engl. 122. Contemporary Literature (3).**

Present-day English and European literature. Collateral readings and reports. Book fee, \$2.50. Prerequisites: same as for Engl. 121. Second semester. Messrs. Riley, Strauch

**Engl. 123. Shakespeare and the Elizabethan Drama (3).**

The development of the English drama, including the important plays of Shakespeare. First semester. Mr. Smith

**Engl. 124. Shakespeare and the Elizabethan Drama (3).**

Continuation of Engl. 123. Second semester.

Mr. Smith

**Engl. 125. English Literature of the Romantic Era (3).**

Poetry and prose of the chief romantic writers—Wordsworth, Coleridge, Scott, Byron, Shelley, Keats, Landor, Lamb, Hazlitt—with consideration of the political, religious, and social problems of the period as they are exhibited in the literature. Readings and Class discussions. First semester. Mr. Severs

**Engl. 126. English Literature of the Victorian Era (3).**

Poetry and prose of the chief victorian writers—Tennyson, Browning, Arnold, Clough, Rossetti, Morris, Swinburne, Macaulay, Carlyle, Mill, Newman, Ruskin—with considerations of the political, religious, and social problems of the period as they are exhibited in the literature. Readings and class discussions. First semester. Not given in 1944-45. Mr. Severs

**Engl. 130. The Renaissance (3).**

The non-dramatic literature of the English Renaissance, with especial emphasis upon the major writers of the late Elizabethan period and the 17th century. Spenser and Milton are not included. Second semester.

Mr. Riley

**Engl. 131. Milton (3).**

The life and works of John Milton in connection with the history of his times and the chief sources of his inspiration, including some study of Spenser and the Spenserians. Second semester. Not given in 1943-44.

Mr. Riley

**Engl. 133. Restoration and Augustan Literature (3).**

Prose and poetry from 1660 to 1745 with special emphasis upon the works of Dryden, Pope, and Swift, and some consideration of the influential ideas of Hobbes, Locke, Berkeley, and Hume. Second semester.

Mr. Clifford

**Engl. 134. Age of Johnson (3).**

English prose and poetry from 1745 to 1798. Dr. Johnson and his circle and the pre-romantics, including Burns and Blake. Not given in 1943-44. Second semester.

Mr. Clifford

**Engl. 141. Biographies of Great Men (3).**

A comparative study of biographical writing as illustrated by famous lives of great men in literature and history. Attention will be given to the development of biography and to the various theories and schools of biographical writing.

Mr. Clifford

**For Graduates**

Students desiring to take courses leading to the master's degree in English literature should have taken in their undergraduate work at least twelve semester hours of advanced courses in this field. Preliminary courses may be required of students to make up any deficiency before being admitted to candidacy for the master's degree.

Of the thirty hours required for the degree, at least eighteen must be in English major courses; fifteen of the thirty must be taken in courses chosen from the "200" group. A thesis, if required and accepted, is credited as six of the thirty hours. A student may choose collateral work amounting to six hours in courses not related to his major field, or take the full thirty hours in his major field. A final comprehensive examination, usually oral, covering the field of English literature, is required before the student is recommended for the degree.

**Engl. 220. Graduate Seminar (3).**

An intensive study of the works of an English author or a type of literature. Summer session.

Messrs. Smith, Riley, Severs

**Engl. 221. Graduate Seminar (3).**

Research and reports. First semester. Mr. Smith

**Engl. 222. Graduate Seminar (3).**

Continuation of Engl. 221. Second semester. Mr. Smith

**Engl. 227. Anglo-Saxon (3).**

A study of the Anglo-Saxon language and literature. Lectures and supplementary reading in the history of the English language and its relation to other Indo-European languages. First semester. Mr. Riley

**Engl. 228. Chaucer (3).**

A study of the life and principal works of Chaucer, with some attention to his chief contemporaries. Readings and reports, class discussions. Second semester. Mr. Severs

**Engl. 229. Literary Criticism (3).**

A course aimed to correlate and unify the student's previous work in literature by means of wide reading in critical literature and discussions of theories and schools of criticism. First semester. Mr. Smith

**Engl. 230. Literary Criticism (3).**

Continuation of Engl. 229. Second semester. Mr. Smith

**Engl. 231. Graduate Thesis (3).**

First semester. Mr. Smith

**Engl. 232. Graduate Thesis (3).**

Second semester. Mr. Smith

**Engl. 233. Literature of the 14th Century (3).**

Types of medieval literature with special attention to Langland, Gower, Chaucer. Mr. Severs

**SPEECH**  
**ASSISTANT PROFESSOR RIGHTS**

**Speech 30. Fundamentals of Speech (3).**

A foundation course designed to develop knowledge of the basic principles of speech, ability to speak effectively on the platform, and a critical attitude toward contemporary public address. Prerequisites: Engl. 1 and 2. First and second semesters.

**Speech 31. Business Speaking (3).**

Principles of individual problem-solving and group policy-deliberation; practice in the conduct of personal interviews and conferences; delivery of reports, instructions, and explanations; promotional, inspirational, and good-will talks; after-dinner speeches; speeches of courtesy; telephone speaking. Prerequisite: Speech 30. Second semester.

**Speech 32. Argument and Discussion (3).**

The technique of investigation, analysis, evidence, inference, brief making, and refutation in oral argument. Participation in the various types of debate, conventional, cross-examination, and direct-clash, and in various forms of discussion, with emphasis on the panel and the symposium. Each student selects a topic for investigation and argument throughout the semester. Prerequisite: Speech 30. Second semester.

**Speech 33. Parliamentary Procedure (1).**

Study and drill in modern rules and methods of conducting organized group-deliberation. Prerequisite: consent of the head of the department. First semester.

**Speech 61. Dramatics (3).**

The practical technique and production of plays; acting, stage-lighting, scenic design and execution, and student direction of plays. Each member must write either an original one-act play or a thesis upon any practical problem of the modern theater. One play is presented each semester. Prerequisites: Engl. 4 and 5. Fee, \$3.00. Not offered in 1944-45.

**Speech 62. Dramatics (3).**

Continuation of Speech 61. Fee, \$3.00. Not offered in 1944-45.

**For Advanced Undergraduates and Graduates**

**Speech 160. Speech for the Teacher (3).**

An orientation course in the field of speech for those engaged in classroom teaching or in directing extracurricular speech activities. Discussion as a teaching device; integration of speech with other subjects; recognition of common defects of speech; modern emphases in speech contests; individual investigations, report, and conferences. Summer session.

**Speech 161. Dramatics (3).**

A practical course in production of plays; problems of designing of scenic effects, directing, and acting. Particular attention will be given to the difficulties encountered by those who teach dramatics. A production will be given by the class. Fee, \$5.00. Summer session. Mr. Rights

**JOURNALISM**  
ASSISTANT PROFESSOR RIGHTS

Students majoring in journalism take Journ. 11, 12, 13, 14, 16, 18, 20. They must also register for and complete Journ. 1-8 each semester, after declaring their major. Other requirements include twelve hours to be chosen from the following courses: Engl. 4, 5, 8, 9, 20, 21, 123, and 124, or in such equivalents as may be allowed; and also Hist. 25 and 26 or 129 and 130, Govt. 51 and 52, Eco. 3 and 4, Soc. 161 and 162, and one of the follow-

ing: Govt. 157 and 158, Eco. 133 and 134, Eco. 11 and 113. During the junior or senior year a field trip to New York is taken to visit metropolitan newspaper plants, and the headquarters of press associations, feature syndicates, photo services, etc. In alternate years the trip is taken to Washington, D. C. The comprehensive examination in journalism includes the content of courses studied in the sophomore, junior, and senior years.

**Journ. 1-8. Brown and White (1).**

Enrollment constitutes membership on the staff of the semi-weekly paper. All composition work is for publication. Students enrolling for their first semester sign for Journ. 1; for their second semester, Journ. 2; etc. By faculty action this course may be elected each semester for credit in addition to other courses in a student's roster. Students also enroll in Journ. 1-8 for the business staff of the paper. Fee, \$1.00. First and second semesters.

**Journ. 11. Newspaper Reporting and Writing (3).**

A beginning course in newspaper journalism. Definition of news; news values and reader interest; structure of the news story; newspaper English; how to report and write simple news stories. Prerequisites: Engl. 1 and 2. Fee, \$2.00. First semester.

**Journ. 12. Advanced Newspaper Reporting and Writing (3).**

Continuation of Journ. 11. A course in the reporting and writing of particular types of news, including sports-writing. Special attention is paid to news of public affairs. Fee, \$2.00. Second semester.

**Journ. 13. Newspaper Editing and Copy Reading (3).**

Study and practice of the technique of the newspaper copy reader and news editor; headline writing and makeup. Prerequisites: Journ. 11 and 12. Fee, \$1.50. First semester.

**Journ. 14. Press Photography (3).**

A study of the fundamentals of taking pictures, developing negatives, and making enlargements for publication purposes. Course includes a background understanding of camera, lenses, filters, etc.; and includes a laboratory period in use of camera, developing film, and enlarging. First and second semesters.

**Journ. 15. Editorial Writing and Modern Problems (3).**

The content and technique of the editorial. Discussion of modern problems and review of individual prejudices as preliminary to writing of editorials on contemporary events. Includes other types of critical writing: dramatic and book reviews.

**Journ. 16. Newspaper Problems and Policies (3).**

A study of the ethical principles of newspaper publishing. "To print or not to print" sensational or "yellow" journalism; tabloids; faking;

ghost writing; crusades. Study of the law of libel and of postal regulation governing newspapers. Prerequisites: junior standing. Second semester.

**Journ. 17. Newspaper Feature Writing and News Photography (3).**

Writing of all kinds of feature articles from newspaper "brighteners" and columns to articles of the Sunday magazine type. Includes a study of the fundamentals of taking pictures, developing negatives, making prints; and an understanding of the news-type camera.

**Journ. 18. History of American Journalism (3).**

English background of American newspaper; development of press from colonial days to the present; influence of newspaper on American life; contributions of outstanding journalists. Prerequisite: junior standing. Second semester.

**Journ. 20. Journalism Proseminar (3).**

Required of students of senior standing who are majoring in journalism. Survey of the newspaper field in its relation to public affairs. Extensive reading in books, magazines, and newspapers. Second semester.

**Journ. 21. Writing for Publication (3).**

A study of modern magazines and publications as interpreters of contemporary civilization, supplemented by writing for such publications in whatever field the individual student is interested. Prerequisites: *Engl. 1 and 2*. First semester.

**Journ. 22. The Short Story (3).**

A course in writing fiction, supplemented by a study of the short story as a form of expression. Class discussion, round-table discussion of student writing, and collateral reading. Prerequisites: *Engl. 1 and 2*. Second semester.

**Journ. 43. Writing for Business.**

Study and practice in writing business news stories and reports which the business man must prepare; the employee magazine. Prerequisites: *Engl. 1 and 2*. First and second semesters.

**For Advanced Undergraduates and Graduates**

**Journ. 101. Modern Newspaper Practice (3).**

A practical course dealing primarily with the methods of securing, writing, and editing news. The evaluation and organization of materials; practice in the preparation of news for publication. Study of news sources and values and reader interest. The place of the press in modern society. The difficulties encountered by faculty advisers of secondary school publications; individual conferences with such advisers. Summer session.

**FINANCE**

PROFESSOR BRADFORD

**Fin. 21. Corporation Finance (3).**

The methods of corporations in obtaining capital, issuing securities, and extinguishing debts, the rights and obligations of security holders and problems of corporation insolvency and dissolution. Prerequisite: *Eco. 4.* Not offered in 1943-44. First semester.

**Fin. 22. Corporation Finance (3).**

Continuation of Fin. 21. Prerequisites: *Eco. 4;* Fin. 21. Not offered in 1943-44. Second semester.

**Fin. 25. Corporation Finance (3).**

An intensive course covering the fundamentals of corporation finance in one semester. Especially designed for engineering students. Prerequisite: *Eco. 4.* First semester.

**Fin. 33. Money and Banking (3).**

The nature and development of money and banking, the principles of banking; Federal Reserve policy and practice; the value of money; monetary and banking problems; non-commercial banking. Primary prerequisite: *Eco. 4.*

**For Advanced Undergraduates and Graduates**

**Fin. 123. Investments (3).**

A study, from the standpoint of the investor, of the various types of corporation and government securities, with special reference to owners' equities, comparative yields and the machinery of investment, including stock exchange operations. Prerequisite: *Fin. 22 or 25.* First semester.

Mr. Bradford

**Fin. 124. Investments (3).**

A project course in investment analysis for advanced students who are already familiar with investment principles. Sources of data and analysis procedures; the securities of industrials, railroads, public utilities, and municipalities. Prerequisite: *consent of the head of the department.* Not offered in 1943-44. Second semester.

Mr. Bradford

**Fin. 126. Public Finance (3).**

A one-semester course dealing with government expenditures and revenues, public debts and taxation, with emphasis on the economics and the administration of federal and state taxes. Prerequisite: *Eco. 4.* Second semester.

Mr. Bradford

**Fin. 131. Banking and Credit Problems (3).**

An intensive study of the major banking, credit, and monetary problems and policies of current interest to the banker and the public. Prerequisite: *Fin. 33.* Not offered in 1943-44. First semester.

Mr. Bradford

FINE ARTS

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**Fin. 132. Banking and Credit Problems (3).**

Continuation of Fin. 131. Prerequisites: *Fin. 33; Fin. 131.* Not offered in 1943-44. Second semester. Mr. Bradford

**Fin. 135. Transportation (3).**

The economics of transportation by rail, highway, water, pipeline, and air. Effects of transport costs on prices and on location of industries and markets, rate theory and practice, regulation, finance, government ownership, and coordination. Prerequisite: *Eco. 4.* First semester. Mr. Bradford

**Fin. 136. Public Utilities (3).**

Rate making, finance, combination, public ownership, federal power policy, and related problems in the electric, gas, and telephone industries. Prerequisite: *Eco. 4.* Second semester. Mr. Bradford

**Fin. 171. Readings in Finance (3).**

A course of readings in various fields of finance, designed for the student who has a special interest in some field of finance not covered by the regularly rostered courses. Prerequisites: senior standing and consent of the head of the department. First semester. Mr. Bradford

**Fin. 172. Readings in Finance (3).**

Continuation of Fin. 171. Prerequisites: senior standing and consent of the head of the department. Second semester. Mr. Bradford

FINE ARTS

ASSOCIATE PROFESSOR HOWLAND

**F.A. 3. History of Architecture (3).**

The development of architecture from its beginning in Egypt and Mesopotamia, through Greece and Rome, the Early Christian period, and the Romanesque; and briefly the architecture of the Orient. First semester.

**F.A. 4. History of Architecture (3).**

Continuation of F.A. 3. The development of Gothic architecture, the Renaissance, and successive movements down to and including the present day. Second semester.

**F.A. 5. Freehand Drawing (3).**

Elementary freehand perspective, followed by drawing from still life objects and casts in pencil, charcoal, and in the various modes: delineation, form-drawing, color value. First semester.

**F.A. 6. Freehand Drawing (3).**

Further practice in expression; color theory with simple exercises in water colors or oils. Second semester.

**F.A. 11. Ancient and Medieval Art (3).**

An approach to the understanding and enjoyment of the arts. The development of art is traced through the ancient and medieval periods. The relation between artistic expression and the age which produced it. Lectures. Open to freshmen. First semester.

**F.A. 12. The Art of the Italian Renaissance (3).**

Painting, sculpture and architecture are examined as the outgrowth of conditions in Italy during the fourteenth, fifteenth, and sixteenth centuries; the influence of medieval thought and tradition, the awakening interest in nature, the effect of antiquity, especially the stimulus it gave to individual effort. Lectures. Open to freshmen. Second semester.

**F.A. 13. The Art of the Northern Renaissance (3).**

Art in Europe other than Italy from the fifteenth century to the French Revolution. Contrasts between native tendencies and foreign influences, especially those of the Italian Renaissance, with the resulting struggle between idealism and realism. Lectures. Prerequisites: F.A. 12. First semester.

**F.A. 14. Modern Art (3).**

The nineteenth and twentieth centuries. The historical relationships, the underlying theories, and the influence of contemporary thought as aids in understanding modern art. The treatment includes Classicism, Romanticism, Impressionism, and the various modern schools. Prerequisite: F.A. 11 or 12. Second semester.

**F.A. 17. Criticism and Analysis of Art (3).**

A critical analysis of the divergent views of the nature of art, its origin and intention. The ancient writers are consulted for views held in Greece and Rome. Factors in molding art opinion in the Middle Ages. Changes in the Renaissance. Primarily for majors. Prerequisites: F.A. 11 and 12, or suitable preparation in the history of fine arts, and consent of the head of the department. First semester.

**F.A. 18. Criticism and Analysis of Art (3).**

Continuation of F.A. 17 with special attention to art criticism since the 17th century. Prerequisite: same as for F.A. 17. Second semester.

**F.A. 19. Prints and Print Processes (3).**

History and methods of making wood-cuts, engravings, etchings, aquatints, mezzotints, lithographs. Laboratory experiments when practicable. Prerequisite: consent of the instructor. Offered only where there is no demand for F.A. 17 and 18. Second semester.

**F.A. 25. Principles and Practices of Landscape Painting (3).**

Oil painting based upon the principles which underlie the treatment of landscape. The greater portion of the time is devoted to actual painting

from nature, in accordance with the methods and theories employed by artists of various schools. Weekly lectures, illustrated by lantern slides and color-reproductions, on composition, technique, color, light, plastic and spatial effects, mood. Prerequisite: consent of the head of the department. Summer session.

**FRENCH**

**See Romance Languages**

**GEOLOGY**

PROFESSOR WILLARD

ASSOCIATE PROFESSORS FRETZ, WHITCOMB, AND STEWART

**Geol. 1. Mineralogy (3).**

The principles of crystallography with practice in determination of forms of models and crystals; the physical properties, origin, occurrence, association, and alteration of minerals; a study of about one hundred twenty of the common mineral species and varieties, with practice in identification based on physical properties and blowpipe analysis. Students should have had Chem. 1 or 2, and 11 or 12, or 3 and 13 or 14. Fee, \$5.00. First semester.

**Geol. 2. Engineering Mineralogy (2).**

Elementary crystallography and the occurrence and properties of the common minerals. Elements of crystal structure, and physical and chemical properties of crystals. Students should have Chem. 1 and 11 or 12; or 3 and 13 or 14. Planned for the metallurgical engineering curriculum and for students in chemistry and physics. Fee, \$5.00. First semester.

**Geol. 5. Petrology (3).**

Macroscopic study of igneous, sedimentary, and metamorphic rocks; their origin, classification, and identification. Prerequisite: Geol. 1 or 2. Second semester.

**Geol. 8. Historical Geology (3).**

The development of the continents and life forms; evolution based on the remains of animal and plant life preserved in the rocks. Text book, lectures, and laboratory exercises. Prerequisite: Geol. 10, or 16 and 17. Second semester.

**Geol. 9. Engineering Geology (3).**

Designed primarily for engineering students. Selected minerals, rocks, building stones, and road materials. Applications of geology to the construction of dams, tunnels, building foundations, and highways, and to the problems of underground water conditions, flood control, etc. Two lectures and one laboratory per week. Prerequisite: Geol. 10. Second semester.

**Geol. 10. Principles of Geology (3).**

An introductory survey of geologic processes. Lectures, field trips, laboratory exercises on common minerals, rocks, ores, fossils, and the study of topographic maps. Fee, \$1.00. First and second semesters.

**Geol. 16. Physiography (3).**

The origin, history, and economic significance of topographic features, soils and natural resources; occasional field trips and laboratory work devoted to instruction and practice in the interpretation and construction of topographic maps. First semester. Not given in 1944-45.

**Geol. 17. Physiography (3).**

Continuation of Geol. 16. Meteorology, climatology, oceanography, and geographical location. Factors constituting the natural environment in their effect upon man. Laboratory and field exercises. Prerequisite: Geol. 16. Not given in 1944-45. Second semester.

**Geol. 18. Meteorology and Climatology (3).**

The atmosphere and its work; investigations of climate. One laboratory period each week is devoted to meteorological instruments, preparation, and interpretation of weather maps and other meteorological data, and making forecasts. Not given in 1944-45. Second semester.

**For Advanced Undergraduates and Graduates**

**Geol. 101. Applied Mineralogy Laboratory (1).**

Preparation of polished surfaces of metallic ores and mill products. Identification of minerals by reflecting microscope and etching methods. Interpretation of textures and structures of ores with special reference to origin. Relation of textures and structures to ore dressing processes and concentration problems. For students interested in study of the metallic ores and their concentration. Prerequisite: Geol. 108 (may be taken concurrently). Second semester. Not given in 1944-45.

**Geol. 107. Non-metallic Economic Geology (2).**

The origin, modes of occurrence, properties, sources, production, and uses of non-metallic mineral products exclusive of the mineral fuels. Prerequisites: Geol. 5, and 10 or 16 and 17. First semester. Mr. Stewart

**Geol. 108. Metallic Economic Geology (3).**

The geological occurrence, origin, distribution, uses, and commercial production of metalliferous minerals; consideration of the most important mining districts. Recitations, illustrated lectures, field trips, and laboratory examination of ore specimens from representative districts. Prerequisites: Geol. 5 and 8. Second semester. Mr. Stewart

**Geol. 109. Paleontology (3).**

Plants and animal fossils from the morphologic point of view; their use in interpreting geologic history; evolution of the faunas and floras. Lectures and laboratory work. Prerequisites: Geol. 10, or 16 and 17; or Biol. 1, 10 or 7 and 8. First semester. Mr. Whitcomb

**Geol. 110. Stratigraphy and Sedimentation (3).**

The origin, history, sequence, and correlation of bedded rocks, their faunas, ages, distribution, and structures. Lectures, laboratory, and field trips. Prerequisites: *Geol. 10, or 16 and 17, 8; Geol. 1, 5, 109.* Second semester. Mr. Willard

**Geol. 111. Field Geology (2).**

Practice in mapping and field work. Each student is assigned a definite area and is required to prepare a report thereon with geologic map, structure section, and collection of a full set of specimens. Prerequisites: *Geol. 10, or 16 and 17, 1, 5, 8, 110, 114, Geol. 107, 108, 109, 124.* Fee, \$1.00. First semester. Mr. Willard

**Geol. 114. Structural Geology (3).**

The major and minor structures encountered in both the massive and the layered rocks of the earth's crust. Typical problems of the type encountered in geological, geophysical, and mining work are studied in the laboratory. Prerequisite: *Geol. 10.* First semester. Mr. Whitcomb

**Geol. 116. Proseminar (1).**

Investigation of current and classic geological literature. Assigned reading and reports. Participated in by members of the teaching staff and advanced students. First and second semesters.

**Geol. 117. Geochemistry (2).**

The chemical and physicochemical processes involved in the formation of minerals, precipitation of sediments, solidification of igneous rocks, ore deposition, metamorphism, weathering, and related problems involved in the origin and subsequent changes of the igneous and sedimentary rocks. Prerequisites: *Geol. 5; Geol. 10, or 16 and 17; Geol. 123, 124.* First semester. Mr. Stewart

**Geol. 118. Geology of Mineral Fuels (3).**

Origin and occurrence of coal, oil, gas, and other bitumens. Characteristics of domestic and foreign fields. Laboratory period devoted to discussion and solution of geological problems encountered. Prerequisite: *Geol. 10, or Geol. 16 and Geol. 17, and Geol. 8.* Second semester. Mr. Stewart

**Geol. 123. Optical Crystallography (3).**

The polarizing microscope and its application in the examination and identification of minerals by the immersion method and in thin section. Prerequisites: *Geol. 1, 5, and 10.* First semester. Mr. Stewart

**Geol. 124. Petrography (3).**

Microscopic studies of igneous, sedimentary and metamorphic rocks in thin section. Prerequisites: *Geol. 1, 5, 10, and 123.* Second semester. Mr. Stewart

**Geol. 128. Crystal Structure (2).**

Concept of symmetry from viewpoint of structural crystallography. Various types of structures and relations to physical and chemical proper-

ties. Application of theory of crystal structure to solid solution, exsolution, isomorphism, inversions, and polymorphism. Interpretation of crystal structure data. Assigned reading of literature. Designed for students in physics, chemistry, metallurgy, and geology who are interested in X-ray investigation and modern theory of atomic structure. Prerequisites: Geol. 1 or 2; Chem. 1 and 11; Math. 1, Phys. 22, or their equivalent. Not given in 1944-45. First semester.

**Geol. 171. Geological Problems (1 to 4).**

Special problems in field, laboratory, and library. Specific work is assigned in individual cases. Prerequisite: completion of substantially all of the "100" courses in geology. Prospective students for this course should consult the department head. First semester.

Messrs. Willard, Whitcomb, Stewart

**Geol. 172. Geological Problems (1 to 4).**

Similar to Geol. 171. Geol. 172 may be elected as a continuation of Geol. 171 or separately. Prerequisites as for Geol. 171. A maximum of 6 credit hours for Geol. 171 and 172 only may be counted. Prospective students should consult the department head. Second semester.

Messrs. Willard, Whitcomb, Stewart

**For Graduates**

**Geol. 220. Geological Investigation (1 to 6).**

The investigation of special problems. Field, laboratory, library work on some limited area; presentation of a report thereon. Prospective students should consult the department head. Geol. 220 may be elected separately from Geol. 221. First semester.

Messrs. Willard, Whitcomb, Stewart

**Geol. 221. Geological Investigation (1 to 6).**

Similar to Geol. 220. May be elected as a continuation of Geol. 220 or separately. Prospective students should consult the department head.

Messrs. Willard, Whitcomb, Stewart

**Geol. 222. Advanced Economic Geology (3 to 6).**

Advanced work in ore deposits. Theories of ore deposition, together with detailed work on the type occurrences of some of the metallic or non-metallic minerals; thorough investigation and report on some mining district with special regard to the origin of the ores and such commercial aspects of the deposits as may depend chiefly on the geology; preparation and microscopic study of specimens of ores. Prerequisites: Geol. 107, 108. First semester.

Mr. Stewart

**Geol. 223. Advanced Economic Geology (3 to 6).**

Continuation of Geol. 222. Second semester.

Mr. Stewart

**Geol. 225. Advanced Physiography (4).**

The detailed study of physiographic types and processes. Conferences, reports, and thesis, with work in the laboratory and field. Prerequisite: training in elementary physiography and general geology. First semester.

Mr. Whitcomb

**Geol. 227. Physical Crystallography (2).**

An advanced course in the geometrical and physical properties of crystals with special reference to the Goldschmidt method of crystal measurement and projection. Prerequisites: Geol. 1, Phys. 24. Not given in 1944-45. Second semester.

**Geol. 230. Advanced Paleontology (3).**

A detailed study of selected groups of fossils, generic and specific differences, identifications, descriptions, and preparation of fossils. First semester.

Messrs. Willard, Whitcomb

**Geol. 231. Advanced Historical Geology (4).**

An advanced course dealing with the problems of historical and stratigraphic geology. Reading and conferences. Second semester.

Messrs. Willard, Whitcomb

**GERMAN**

PROFESSORS PALMER AND MORE  
ASSISTANT PROFESSOR TREMPER

**Ger. 1. Elementary German (3).**

First semester.

**Ger. 2. Elementary German (3).**

Continuation of Ger. 1. Prerequisite: *Ger. 1 or the equivalent*. Second semester.

**Ger. 3. Intermediate German (3).**

German prose and poetry. Outside reading. Composition. Prerequisite: *one year of college German or entrance German A*. First semester.

**Ger. 4. Intermediate German (3).**

Continuation of Ger. 3. Prerequisite: *Ger. 3 or the equivalent*. Second semester.

**Ger. 7. German of Chemistry (3).**

Rapid reading of selected texts on chemistry. Prerequisite: *one year of college German or entrance German A*. First or second semester.

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**Ger. 9. Advanced German, Prose and Poetry (3).**

Rapid reading of representative texts; collateral reading. Prerequisites: two years of college German or entrance German B. First semester.

### **Ger. 10. Goethe's Faust (3).**

Study of Part 1. Lectures on the origin and development of the Faust story; collateral reading. Prerequisite: *Ger. 9 or high standing in Ger. 3, 4, or 7*. Second semester.

**Ger. 22. Conversation and Composition (3).**

Review of German grammar. German composition, and conversation. Prerequisite: *Ger. 10 or high standing in Ger. 3, 4, or 7.* First or second semester.

**For Advanced Undergraduates and Graduates**

**Ger. 111. Nineteenth Century German Drama (3).**

Lectures, reading, reports on assigned work. Prerequisite: *Ger.* 10 or the equivalent. First semester. Messrs. Palmer, More

**Ger. 112. Nineteenth Century German Drama (3).**

Continuation of Ger. 111. Prerequisite: *Ger. 10 or the equivalent.*  
Second semester. Messrs. Palmer, More

**Ger. 113. Lessing, Goethe, and Schiller (3).**

Prerequisite: Ger. 10 or the equivalent. First semester. Mr. Palmer

**Ger. 114. Lessing, Goethe, and Schiller (3).**

Continuation of Ger. 113. Prerequisite: *Ger. 10 or the equivalent.*  
Second semester. Mr. Palmer

### **Ger. 115. The German Short Story (3).**

Origin and development. Rapid reading of illustrative stories, with particular attention to Gottfried Keller, Theodor Storm, C. F. Meyer, and Paul Heyse; lectures and reports. Prerequisite: *Ger. 10 or the equivalent.* First semester. Mr. Tremper

## **Ger. 116. The German Short Story (3).**

Continuation of Ger. 115. Prerequisite: *Ger. 10 or the equivalent.*  
Second semester. Mr. Tremper

## **GOVERNMENT**

## **See History and Government**

**GREEK****Gk. 1. Elementary Greek (3).**

For all students who desire to obtain a fundamental knowledge of the Greek language. Early in the semester there will be reading in stories and legends in easy Greek. First semester.

**Gk. 2. Elementary Greek (3).**

Continued work in Greek vocabulary, forms, and syntax. Selections from Xenophon's *Anabasis*. Second semester.

**Gk. 3. Second-Year Greek (3).**

*Anabasis*; *Iliad* (if time permits); grammar and simple composition. (Offered only when Gk. 1 and 2 have been given in the preceding year). Prerequisites: Gk. 1 and 2, or one year of entrance Greek. First semester.

**Gk. 4. Second-Year Greek (3).**

Continuation of Gk. 3. Second semester.

**Gk. 7. Thucydides (3).**

One or more books. Composition. Prerequisites: Gk. 15 and 16. First semester.

**Gk. 8. Tragedy (3).**

Euripides, *Medea*, *Bacchae*, or another play. Sophocles, *Oedipus Tyrannus*, *Antigone*, or another. Literary study of the drama; poetical language, style, and conception; metrical reading; composition. Prerequisites: Gk. 15 and 16. Second semester.

**Gk. 9. Dramatic Poetry (3).**

Aeschylus, *Agamemnon* or *Prometheus Bound*. Aristophanes, *Clouds*, *Frogs*, or *Birds*. Aristophanes as humorist and as moralist, with consideration of the tendencies which he satirized. Meters. Elementary text-criticism. Prerequisites: Gk. 8, 15, and 16. First semester.

**Gk. 10. Greek Oratory (3).**

Selections from the earlier Attic orators and Desmosthenes. Rapid reading, the student being supposed to have reasonable facility in understanding the Greek directly without rendering into English. Attention is directed largely to those points which illustrate the development of Greek prose style. Prerequisites: Gk. 15 and 16. Second semester.

**Gk. 11. Homer (3).**

Rapid reading of considerable portions of the *Iliad* or the *Odyssey*. Homeric language, syntax, and meter reviewed with some reference to the needs of intending teachers, but chiefly as a foundation for the study outlined in Gk. 12. Prerequisites: Gk. 15 and 16. First semester.

**Gk. 12. Lyric Poetry (3).**

Fragments of the Elegiac, Iambic and Melic poets; selections from Pindar of Theocritus. Prerequisites: Gk. 11, 15 and 16. Second semester.

**Gk. 13. Hellenistic Greek (3).**

*New Testament*. Selections from Lucian. To be submitted on occasion for Gk. 12. Prerequisites: Gk. 15 and 16, and the approval of the professor. Second semester.

**Gk. 15. Homer and Herodotus (3).**

*Iliad*, I-III, or selected books of the *Odyssey*. Herodotus,—selections. Study of the forms and syntax of the Homeric and Ionic dialects; grammatical analysis; reading aloud of Greek; sight-reading; composition. Prerequisites: Gk. 1, 2, 3, and 4, or entrance Greek. First semester.

**Gk. 16. Plato (3).**

*Euthyphro*, *Apology*, or other shorter dialogues. Grammar and composition as in the first semester. Prerequisite: Gk. 15. Second semester.

Courses Gk. 9 and 11, 10 and 12 (or 13) are offered in alternate years, and are open to both juniors and seniors.

**Gk. 83. The Economic and Social Life of the Greeks (3).**

A study of the activities of the Greeks with special reference to domestic arts, religion, athletics, warfare, medicine, education, social customs and commerce. Numismatics and vase painting. Lectures, collateral readings, and reports. Prerequisite: *consent of the instructor*. First semester.

**Gk. 99. Ancient Science (3).**

A study of the architecture, mining, machinery, medicine, husbandry, etc. as developed by early peoples, especially by the Greeks and the Romans. A comprehensive view of the knowledge and use of natural resources. No knowledge of the Greek or Latin language is required. Second semester.

**For Advanced Undergraduates and Graduates**

**Gk. 100. Greek Literature in English Translation (3).**

The development of the major departments of Greek literature with required readings in English translations, with special attention to the epic, drama, and lyric poetry. First semester.

**Gk. 121. Alexander the Great and the History of the Hellenistic Period (3).**

A study of the political and social conditions of the Hellenistic period and the Greek influence upon contemporary and later civilization. First semester.

**Gk. 181. Greek Archaeology (3).**

Aims and Methods. A chronological presentation of prehistoric civilizations including the Neolithic, Minoan, Helladic, and Mycenean periods. A study of extant ancient monuments, buildings, and city plans of important sites of the classical and hellenistic periods. Lectures, collateral readings, and reports. Prerequisite: *consent of the instructor*. First semester.

**For Graduates**

Candidates must satisfy the head of the department as to their adequate preparation for advanced work. Ordinarily students will be expected to have had in their undergraduate work at least four years of work in Greek.

**Gk. 201. Greek Poetry (3).**

The development of poetry in Greece from Homer to the drama, with special study of the lyric poets, and collateral reading. First semester.

**Gk. 202. Greek Poetry (3).**

Continuation of Gk. 201. Second semester.

**Gk. 203. Greek Philosophy (3).**

The history of philosophic thought in Greece, particularly in the pre-Socratic period, Ritter and Preller's *Historia Philosophiae Graecae*, and collateral reading. First semester.

**Gk. 204. Greek Philosophy (3).**

Continuation of Gk. 203. Second semester.

**Gk. 205. Hellenistic Greek (3).**

Portions of the Gospels in a comparative study, the Acts, and selected *Epistles*. Chapters from the *Septuagint* Patristic literature. Collateral readings. Selections from Lucian. First semester.

**Gk. 206. Hellenistic Greek (3).**

Continuation of Gk. 205. Second semester.

**HISTORY AND GOVERNMENT**

PROFESSORS GIPSON AND HARMON  
ASSOCIATE PROFESSOR SCHULZ

**HISTORY**

**Hist. 13. United States History (3).**

The era of constitution-making; the evolution of political parties; foreign relations during the wars of the French revolutionary period; the western movement and western state-building; the growth of sectionalism. First semester.

**Hist. 14. United States History (3).**

The war for the Union; the reconstruction of the South; the era of big industry and labor combinations; the United States as a world power; the new national paternalism. Second semester.

**Hist. 25. European History (3).**

A rapid survey of the major historic forces from the collapse of the Roman Empire to the sixteenth century. The cultural aspects of medieval society. Not given in 1944-45. First semester.

**Hist. 26. European History (3).**

Continuation of Hist. 25. A detailed account of historic developments from the sixteenth to the nineteenth centuries. Not given in 1944-45. Second semester.

**Hist. 27. European Expansion and Empire-Building, 1492-1700 (3).**

Aspects of the phenomenon of the spread of European civilization and empire into the continents of America, Asia, and Africa. Not given in 1944-45. First semester.

**Hist. 28. European Expansion and Empire-Building, 1700-1820 (3).**

The rivalry of imperial systems; the disappearance of French power in the New World; the movements for independence of the English, Spanish and Portuguese colonials. Not given in 1944-45. Second semester.

**Hist. 29. Modern Europe (3).**

The study of Revolution and reaction in Western Europe between 1789 and 1870. Emphasis is laid upon the birth, growth, and spread of nineteenth-century liberal doctrines as well as upon the attempts made to stifle that growth by every political and diplomatic means available. Not given in 1944-45. First semester.

**Hist. 30. Modern Europe (3).**

The study of the rise of the new imperialism between 1870 and the present with emphasis laid upon the political factors in the break-down of the imperial system. Not given in 1944-45. Second semester.

Attention is called also to the following courses in history offered by other departments: ANCIENT HISTORY, THE ROMAN REPUBLIC, and THE ROMAN EMPIRE, by the department of Latin; INDUSTRIAL EVOLUTION by the department of Economics and Sociology.

**For Advanced Undergraduates and Graduates**

**Hist. 115. Political and Social History of England (3).**

The history of the rise and growth of English political and social institutions prior to 1603. Not given in 1944-45. First semester.

Mr. Ettinger

**Hist. 116. Political and Social History of England (3).**

The history of the development of English political and social institutions from the death of Elizabeth to the present. Emphasis is placed upon the political and intellectual legacy bequeathed to the modern world as a result of this development. Not given in 1944-45. Second semester.

Mr. Ettinger

**Hist. 119. Eighteenth Century European Civilization (3).**

This course is concerned with eighteenth-century European civilization. The constitutional, political, economic, and social developments within, and institutions of the more dynamic European states of Great Britain, France, Prussia, and Russia will be contrasted and compared. First semester.

Mr. Gipson

**Hist. 120. Eighteenth Century European Civilization (3).**

This course is concerned with eighteenth-century imperialism. The constitutional, political, economic and social developments within, and institutions of the New World empires of Great Britain, France, Spain, and Portugal when at the height of their power will be contrasted and compared. Second semester.

Mr. Gipson

**Hist. 122. England Under Elizabeth (3).**

Queen Elizabeth and her contemporaries, with a discussion of social, political, and economic backgrounds. Not given in 1944. Summer session.

**Hist. 123. England and the Early Stuarts (3).**

Constitutional and political development of the first half of the seventeenth century; a survey of social England. Not given in 1944. Summer session.

**Hist. 129. American Foreign Policy (3).**

The French alliance; independence and boundaries; commercial restrictions; French Revolution and neutrality; purchase of Louisiana; War of 1812; acquisition of Florida; Monroe Doctrine; relations with France and Great Britain; Oregon and Texas; the Mexican War. First semester.

Mr. Harmon

**Hist. 130. American Foreign Policy (3).**

The Civil War and possible European intervention; Alaska boundary; War with Spain; the new Caribbean policies; the World War of 1914-1918 and its aftermath; diplomatic events preceding Pearl Harbor; outbreak and prosecution of the War; plans for peace. Second semester.

Mr. Harmon

**Hist. 135. The Cultural History of Western Europe (3).**

The study of the heritage bequeathed to modern man by the cultural achievements and traditions of the middle ages and Renaissance. Not given in 1944-45. First semester.

**Hist. 136. The Cultural History of Western Europe (3).**

A continuation of the preceding from the time of the Reformation to the present with emphasis upon the rise of the national states through the period of the industrial revolution and their cultural characteristics. Not given in 1944-45. Second semester.

**Hist. 139. The Civil War (3).**

Background of the Civil War; Buchanan's policy; Lincoln's attitude; views of Davis; Northern and Southern leaders contrasted. Not given in 1944-45. First semester. Mr. Harmon

**Hist. 140. Reconstruction of the Union (3).**

Problems of a restored Union; the policy of Johnson; views of the North and South; radical reconstruction; the election of Grant; the Supreme Court and reconstruction; the restoration of white supremacy in the South. Not given in 1944-45. Second semester. Mr. Harmon

**Hist. 149. Hispanic America in the Nineteenth Century (3).**

Successful movements for independence, recognition, types of governments formed in South, Central, and Caribbean America, wars and revolutions, problems pertinent to foreign trade, application of the Monroe Doctrine and its acceptance. First semester. Mr. Harmon

**Hist. 150. Hispanic America in the Twentieth Century (3).**

Continuation of Hist. 149. Results of the Spanish-American War, Theodore Roosevelt and "big stick" diplomacy, Panama Canal and world trade, debts and interventions. Pan-Americanism, World War and its influence, recent United States relations with Latin America. Second semester. Mr. Harmon

**Hist. 151. A Pro-Seminar in United States and Pennsylvania History for Teachers (3).**

This course is designed to meet the certification requirements of the Pennsylvania State Council of Education, that all teachers in the public schools should have a course in United States history in which particular emphasis is placed upon the history of Pennsylvania. The following topics will be stressed in the pro-seminar: American colonization; racial origins; the beginnings of agriculture, industry and commerce; the expansion of the frontiers; the movement for independence; constitution-framing; the party system of government; cultural tendencies and progress toward social betterment; the problem of states versus national rights; the era of great industry. Summer session. Mr. Gipson or Mr. Harmon

**Hist. 160. History of American Political Parties (3).**

Evolution of major and minor political parties, including the Federalist and Anti-Federalist, the Democratic and Republican, the Populist and Progressive. Party organization and functions; the economic and sectional basis of politics; nomination and election methods; the conduct of campaigns. Not given in 1944. Summer session.

Mr. Harmon

**Hist. 170. The World Since 1919 (3).**

The peace treaties of 1919; the ideals and realities of the League of Nations; efforts to achieve disarmament and lasting peace; resurgence of power politics as displayed by the German-Italian-Japanese Axis; appeasement; frustration. Summer session.

**Hist. 175. Leading Figures in European History (3).**

A series of biographical studies treating of men and women in church and state from Charlemagne to Napoleon. Emphasis is cultural rather than purely historical. Not given in 1944. Summer session.

**Hist. 179. The Far East Since 1800 (3).**

A historical survey of the opening of China and Japan, the transformation of Japan, the partition of China, international rivalries in Korea, Manchuria, and the Philippines; economic and territorial imperialism, and Japanese quests for hegemony. Not given in 1944-45. First semester.

**Hist. 180. Politics and Problems of the Far East (3).**

An analysis of contemporary political and economic problems confronting not only the countries of the Orient but the Western Powers with interests in that region; Japanese aggression and conquests; violations of national rights; military rule; puppet government; military, aerial, and naval strategy; the New Order in Asia; prerequisites of peace in the Far East. Not given in 1944-45. Second semester.

**For Graduates**

Students desiring to major in history and government should have had at least twelve semester hours in connection with their undergraduate work that bear upon this field of study or in other ways should satisfy the department that they are in a position to undertake profitably the required program for the master's degree. Students should register for graduate work only after consultation with the head of the department.

**Hist. 201. English Institutional History (3).**

Political, social, economic, and religious institutions which have most profoundly influenced American civilization. Not given in 1944-45. First semester.

**Hist. 202. English Institutional History (3).**

Continuation of Hist. 201. Not given in 1944-45.

**Hist. 203. England Under the Tudors (3).**

An intensive study of England during the period 1485-1603. Special emphasis will be placed upon the social background. Not given in 1944-45. First semester.

**Hist. 204. England Under the Tudors (3).**

A continuation of Hist. 203. Not given in 1944-45. Second semester.

**Hist. 205. England Under the Stuarts (3).**

A study of the religious, political, and economic problems of the seventeenth century. Not given in 1944-45. First semester.

**Hist. 206. England Under the Stuarts (3).**

A continuation of Hist. 205, but with particular stress upon social and literary activities. Not given in 1944-45. Second semester.

**Hist. 210. The British Commonwealth of Nations (3).**

A survey of the British Empire during the nineteenth century, its metamorphosis into the Commonwealth of Nations, and an attempt to estimate its present significance. Not given in 1944. Summer session.

**Hist. 211. English Colonization in North America in the Seventeenth Century (3).**

The activities of the great overseas trading companies; the problem of proprietorial control; the decline of the chartered colonies; conflicts between opposing political, economic, and religious ideals within the colonies. Not given in 1944-45. First semester. Mr. Gipson

**Hist. 212. English Colonization in North America in the Seventeenth Century (3).**

Continuation of Hist. 211. Not given in 1944-45. Second semester. Mr. Gipson

**Hist. 213. America in the Eighteenth Century (3).**

The workings of the English merchantile system; the evolution of colonial institutions; the international struggle for the fur trade in North America; George III and the new administrative system. Not given in 1944-45. First semester. Mr. Gipson

**Hist. 214. America in the Eighteenth Century (3).**

Continuation of Hist. 213. Not given in 1944-45. Second semester. Mr. Gipson

**Hist. 215. American Constitutional History (3).**

The major problems involved in the growth of the powers of the national government. First semester. Mr. Harmon

**Hist. 216. American Constitutional History (3).**

Continuation of Hist. 215. Second semester.

Mr. Harmon

**Hist. 217. America as a World Power (3).**

The results of the Spanish-American War; the United States' Pacific possessions; Theodore Roosevelt and world affairs; Knox and "Dollar Diplomacy"; the European War I; the American Neutrality; the United States as a belligerent; the treaty of Versailles. Not given in 1944. Summer session.

Mr. Harmon

**Hist. 218. America as a World Power (3).**

The United States and the League; the reconstruction of Europe; the rise of Hitler; the World War II; the Monroe Doctrine; the Good Neighbor policy; the problems of the Pacific: China and Japan; Japan and the United States; the War with Japan. Not given in 1944. Summer session.

Mr. Harmon

**Hist. 227. Research Methods in the Social Sciences (3).**

Technique of research along the lines of historical method. Training in the critical handlings of documentary materials, in measuring the value of evidence, and in formal presentation of the results of research. Required of all graduate students in history and government. Open to seniors by permission. Not given in 1944-45. First semester. Mr. Gipson

**Hist. 228. Research Methods in the Social Sciences (3).**

The emphasis will be placed in this course upon historiography. Not given in 1944-45. Second semester.

Mr. Gipson

**Hist. 241. Pennsylvania History, 1683-1765 (3).**

Various aspects of eighteenth century Pennsylvania history, such as the evolution of the institutions of government, the relations of the settlers to the proprietors, the land policy, the Indian policy, the relations of the various racial groups and religious groups toward one another and toward the provincial government, the relations of Pennsylvania and her colonial neighbors. Not given in 1944. Summer session.

Mr. Gipson

**Hist. 242. Pennsylvania History, 1765-1787 (3).**

Revolutionary movement in provincial Pennsylvania; Pennsylvania at war; the fate of the Pennsylvania loyalists; experiments in constitution-making. Not given in 1944. Summer session.

Mr. Gipson

**Hist. 243. Pennsylvania History, 1787-1860 (3).**

Constitutional, political, economic, and social aspects of the history of the commonwealth within the new Federal Union. Not given in 1944. Summer session.

Mr. Gipson and Mr. Harmon

**Hist. 261. Seminar in International Relations (3).**

Intensive analysis of selected forces and problems of world politics, including forms of political organization; imperialism; nationalism; limitation of armaments; the munitions industry; propaganda; censorship;

pacific settlement of disputes; renunciation of war; collective security; geo-politics; natural resources; markets; trade and tariffs; currency exchange; communications; debts; foreign investments; and population pressure. Not given in 1944-45. First semester.

**Hist. 262. Seminar in International Relations (3).**

Continuation of Hist. 261. Not given in 1944-45. Second semester.

**GOVERNMENT**

**Govt. 1. The Foundations of Government (3).**

A survey of the basic problems of governmental organization and operation with emphasis upon the controversial issues involved and the relevant political institutions and practices, both contemporary and past, of American, European, and Asiatic peoples. First and second semesters.

**Govt. 51. Government of the United States (3).**

The evolution of the Federal Government; constitutional principles; machinery of government; citizenship and immigration; emphasis upon the experiences of the American people in their dealings with government and upon the practical workings of that government. First semester.

**Govt. 52. State Government in the United States (3).**

The position of the states in the union; machinery and activities of state governments; individual rights; the police power; instruments of popular control; the various forms of local government. Second semester.

**Govt. 61. Diplomacy (3).**

Scrutiny of the methods and objectives of diplomacy with particular emphasis upon illustrative documentary materials portraying negotiations and policies as actually pursued by statesmen striving for position and power. First semester.

**Govt. 62. International Relations (3).**

Attention is focused upon the basic factors contributing to contemporary friction; elements of international cooperation in dealing with piracy, counterfeiting, narcotics, extradition; trade and communications; protection of life and property; population and minorities problems; colonies and mandates; balance of power; international organization; post-war order. Second semester.

**For Advanced Undergraduates and Graduates**

**Govt. 151. The American Constitutional System (3).**

The constitutional basis of American government with emphasis upon the principles of the federal system, the organization and powers of the national government, and the relation of the government to the individual in such matters as the protection of persons accused of crime, the protection of contracts, and due process of law. Summer session. Mr. Schulz

**Govt. 157. Municipal Government (3).**

The machinery and processes of municipal government in the United States; city-state relations, the government of metropolitan areas; the forms of city government, proportional representation. Special emphasis upon the working of the council-manager plan. First semester. Mr. Schulz

**Govt. 158. Municipal Administration (3).**

Examination of the fundamental principles of effective administration; a survey of such municipal problems as city planning, health control, urban transportation, police and fire protection, water supply, and waste collection and disposal. Second semester. Mr. Schulz

**Govt. 161. International Law (3).**

Consideration of the rules governing the conduct of states in their relations with one another in time of peace. Not given in 1944-45. First semester.

**Govt. 162. International Law (3).**

Continuation of Govt. 161. The rules governing relations between states in the event of war. Not given in 1944-45. Second semester.

**Govt. 163. Contemporary Political Thought (3).**

Analysis of the basic concepts of political science; state, government, sovereignty, law, liberty, rights; consideration of authoritarian and popular government; presidential and parliamentary systems. First semester. Mr. Schulz

**Govt. 164. Contemporary Political Thought (3).**

Theories concerning the proper role of the State in society and the ethical justification of political coercion; the political aspects of anarchism, communism, socialism, fascism, and political pluralism. Second semester.

Mr. Schulz

**For Graduates**

**Govt. 263. Seminar in Political Theory (3).**

Consideration of theories concerning the nature of the State, its origin, and its role in society. Prerequisites: Govt. 163, 164. Not given in 1943-44. First semester. Mr. Schulz

**Govt. 264. Seminar in Political Theory (3).**

A continuation of Govt. 263. Prerequisites: Govt. 163, 164, 263. Not given in 1943-44. Second semester. Mr. Schulz

**INDUSTRIAL ENGINEERING**

**See Mechanical Engineering**

**ITALIAN**

**See Romance Languages**

**JOURNALISM****See English****LATIN**

PROFESSOR WRIGHT

**Lat. 1a. Latin (3).**

For freshmen who enter with four years of high school Latin. PLINY, selected letters. CICERO, selected letters. Development of letter writing among the Romans and its influence on modern literature. Prerequisite: four years of high school Latin. First semester.

**Lat. 1b. Latin (3).**

For freshmen who enter with three units of Latin. VERGIL, *Bucolics* and the *Aeneid* I-VI, or selections from OVID. Practice in reading aloud and scansion; training in sight translation; the mythology and religion of Greece and Rome; the influence of Latin poetry upon English literature. Prerequisite: three units of high school Latin. First semester.

**Lat. 2. Horace (3).**

Selected Odes. Lectures on the history and development of lyric poetry; constant practice in reading the more important lyric meters; memorizing of stanzas and passages. Prerequisite: Lat. 1a or 1b. Second semester.

**Lat. 4. Livy (3).**

Selections from earlier books. Some study of early Roman history and topography. CATULLUS, selected poems. Prerequisites: Lat. 1 and 2. First or second semester.

**Lat. 11. English Words Derived from the Latin (3).**

Intended to give the students some familiarity with those Latin words that have contributed most largely in derivatives to the English language and to teach the intelligent use of the English dictionary. Elective for all students; no previous knowledge of Latin required. Not given in 1943-44. First semester.

**Lat. 13. Latin Drama (3).**

Drama among the Romans; native dramatic performances; indebtedness to Greek drama; the various dramatic forms and their vogue; chief writers; dramatic festivals; the Roman theater; influences in later literature. Reading of selected plays of Plautus, Terence, and Seneca. Pre-requisite: Lat. 2. First or second semester.

**Lat. 21. Ancient History (3).**

The development of civilization from Paleolithic times to the world empire of Alexander the Great. The first six weeks are assigned to the Stone Age, the Oriental nations, and the Minoan civilization; the remainder of the semester to Hellenic Greek, Political history; the social, economic, religious, philosophic, artistic, and literary development of the ancient world; the origin of political institutions. First semester.

**Lat. 22. Ancient History (3).**

Continuation of Lat. 21. The Hellenistic Age. Rome from its origin to 395 A.D. Second semester.

**Lat. 23. Roman Law (3).**

Preliminary lectures on laws and customs of peoples anterior to the rise of Roman law. The development of Roman law from the *Leges Regiae* to the codification of Justinian. The influence of Roman law on modern nations. Reading of select portions of the law, comparing them with modern law. Prerequisite: sophomore standing. Not given in 1943-44. First or second semester.

**Lat. 24. Roman Political Institutions (3).**

The political institutions established and developed at Rome from the earliest times to the reign of Diocletian. A description and historical survey of political life at Rome and in its provinces by means of lectures, assigned reading, and special reports. Consideration of the titles and duties of state officials during the regal period, the republic, and the empire. Prerequisite: sophomore standing. Not given in 1944-45. First or second semester.

**Lat. 31. Beginning Latin (3).**

Special emphasis on English derivations and the principles of grammar. First semester.

**Lat. 32. Cæsar (3).**

*The Gallic War.* Books I-IV. Prose composition and syntax. Second semester.

**Lat. 33. Cæsar (3).**

Selections from the later books of the *Gallic War* or from the *Civil War*. Prose composition and syntax, with emphasis on clause construction. For students who enter with two years of high school Latin and who elect to continue Latin. Prerequisite: two years of high school Latin. First semester.

**Lat. 34. Cicero (3).**

Orations. Continuation of Lat. 33. Essays: *de Senectute* or *de Amicitia* Prerequisite: Lat. 33. Second semester.

**Lat. 84. The Economic and Social Life of the Romans (3).**

A general survey of Roman life under the following headings; commerce, trade, industrial and domestic arts, agriculture, religion, athletics, amusements, warfare, medicine and surgery, education, marriage and funeral customs, costume, houses, and furniture. Lectures, collateral readings and report. Prerequisite: *consent of the instructor*. Not given in 1944-45. Second semester.

**For Advanced Undergraduates and Graduates**

**Lat. 105. Satire (3).**

Selected satires of Horace and Juvenal. Lectures on the history of Roman satire and its influence on modern literature. Study of social conditions under the empire. Prerequisites: Lat. 13 and 4. First semester.

Mr. Wright

**Lat. 106. Roman Prose Writers of the Empire (3).**

Selections from the following: Petronius, *Cena Trimalchionis*; Apuleius, Cupid and Psyche story from the *Metamorphoses*; Suetonius, *Lives*; Seneca, *Moral Epistles* and *Dialogues*; Tacitus, *Germania*. Prerequisites: Lat. 13 and 4. Not given in 1944-45 Second semester.

**Lat. 107. Vergil (3).**

*Aeneid*, Books VII-XII. Continuation of Lat. 108. Prerequisites: Lat. 13 and 4. Not given in 1944-45. First semester. Mr. Wright

**Lat. 108. Lucretius (3).**

The finest literary passages and selected passages illustrating his philosophy. Ennius and some study of early Roman epic. Vergil's sixth *Aeneid*. An intensive study of its debt to Greek literature, religion, and philosophy, and its influence on modern literature. Lectures on the history of the epic; collateral reading in the great epics of other literatures. Prerequisites: Lat. 13 and 4. Not given in 1944-45. Second semester.

Mr. Wright

**Lat. 109. Latin Prose Composition (3).**

Exercises in translating from English into Latin with a collateral study of Latin grammar. Special attention to clause construction and other points of syntax. Students preparing to teach Latin are expected to elect this course. Prerequisites: Lat. 13 and 4. Not given in 1944-45. First or second semester.

**Lat. 110. The Teaching of High School Latin (3).**

Discussion of aims, content, and methods, and of the standard texts used in preparatory school Latin, with a consideration of the report of the Classical Investigation, of Lodge's *Vocabulary of High School Latin*, and of Byrne's *Syntax of High School Latin*. Students preparing to teach Latin are expected to elect this course. Prerequisite: Lat. 4 and 13. Not given in 1944-45. First or second semester.

**Lat. 121. The Roman Republic (3).**

Special emphasis on governmental and social problems of the last two centuries B.C. and the Hellenistic Greek background of the Roman Empire. Prerequisites: Lat. 21 and 22. Not given in 1944-45. First or second semester.

**Lat. 122. The Roman Empire to the Death of Marcus Aurelius (3).**

Special emphasis upon the development of the principate, and upon the social and economic structure of Rome, the provinces, and the municipalities. Prerequisites: Lat. 21, 22, and 121. Not given in 1944-45. Second semester.

**Lat. 125. Latin Literature in English Translation (3).**

A study of Latin literature by means of the best English translation. No knowledge of the Latin language is required. The lives of the most important authors are studied and their works read according to the major departments of literature,—history, comedy, epic, lyric, etc. Emphasis is placed on the chronological development of the literature and historical background necessary to the interpretation of the author's works. Lectures and readings with special reports. Not given in 1944-45. Second semester.

**Lat. 182. Archaeology of Italy (3).**

Neolithic, Terramare, Villanovan, and Etruscan cultures. Rome the City; its buildings, monuments, and streets, its destruction and rediscovery through excavation; origin and growth of the city; the three periods, empire, republic, and kingdom; methods of identifying and dating monuments. A survey of Pompeii, Herculaneum and Ostia. Lectures, readings, and reports. Prerequisite: consent of the instructor. Second semester.

Mr. Wright

**For Graduates**

For admission to graduate courses the student must satisfy the department of his fitness and adequate preparation. It is generally preferred that applicants have completed twenty-four semester hours of undergraduate college Latin in an approved college or university.

**Lat. 201. Latin Epigraphy (3).**

Text book supplemented by frequent use of the *Corpus Inscriptionum Latinarum* and the standard texts of some of the longer inscriptions, illustrating Roman political institutions, public and private life, and religion. Not given in 1944-45. First semester.

Mr. Wright

**Lat. 202. Topography and Monuments of Ancient Rome (3).**

Lectures (usually illustrated) on the origin, growth, and destruction of ancient Rome and on modern methods of identifying extant monuments. Frequent reports based on a detailed study of the discoveries affecting individual sites. First or second semester.

Mr. Wright

**Lat. 203. Ovid's Fasti (3).**

Substantially the whole of the Fasti. Lectures on the religion of ancient Rome and numerous reports on the various festivals treated in Ovid's poem and its sources. First or second semester.

Mr. Wright

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**Lat. 205. Roman Epic (3).**

Lectures on the history of epic poetry. Intensive study of the *Aeneid* of Vergil and its sources. Not given in 1944-45. First semester.

Mr. Wright

**Lat. 207. Seminar (3).**

Intensive study and reports on the text, history, and interpretation of some work chosen from one of the following authors Livy, Ovid, Horace, Vergil, Cicero, Celsus, Quintilian, and Pliny. Not given in 1944-45. First or second semester.

Mr. Wright

**Lat. 208. Tacitus (3).**

Readings of selections, especially from the Annals. The material on Tiberius and Nero will be particularly studied. Collateral work in Suetonius and Cassius Dio. A study of the comparative credibility of Tacitus, Suetonius, and Dio. Frequent reports by students. Not given in 1944-45. First or second semester.

**Lat. 209. Cicero's Letters (3).**

Reading of a large selection of the letters of Cicero. Study of the political and social background of the period. The other works of Cicero will be used to illustrate the letters. Particular attention will be paid to material of value to teachers of Cicero in the secondary schools. Not given in 1944-45. First or second semester.

**LAW**

**See Accounting**

**MATHEMATICS AND ASTRONOMY**

PROFESSORS FORT, AND REYNOLDS

ASSOCIATE PROFESSORS LAMSON, SHOOK, AND RAYNOR

ASSISTANT PROFESSORS VAN ARNAM AND MEANS

The undergraduate major in mathematics in the College of Arts and Science consists of at least thirty semester hours college credit in mathematics. It must include Math. 15 and Math. 106. The twelve hours advanced credit required by the regulations of the college must be from mathematics courses given at Lehigh University other than Math. 1, 1a, 1b, 11, 11a, 12, 13, 14, 15, 16, 20, 23, 24, and 40.

A major in actuarial science is offered within the department of mathematics. The graduate should be able to pass the examinations for associate in the Actuarial Society of America. The major consists of Math. 11, 12, 13, 14, 15, 40, 42, 43, 51, 124, Acctg. 1, 2, Fin. 25, Eco. 3, 4, 107 and 108.

The department of mathematics accepts candidates for the degree of Doctor of Philosophy who wish to specialize in analysis,

or mechanics. Persons who are interested should read the general regulations of the Graduate School and consult with the head of the department of mathematics.

**Math. A. Review of Intermediate Algebra, Plane and Solid Geometry, Plane Trigonometry (0).**

A review of intermediate algebra, plane and solid geometry, and plane trigonometry as taught in secondary schools for students, primarily veterans, who have completed the work in secondary school but who have not been in contact with formal school work for several years. Five classes a week. Each semester.

**Math. A-1. Review of Algebra and Plane and Solid Geometry (0).**

A review of secondary school algebra, plane geometry, and solid geometry with special emphasis on mensuration, for students, primarily veterans, who have completed the work in secondary school but who need the review work before attempting the freshman courses in college mathematics. Three classes a week. Each semester.

**Math. B. Solid Geometry (0).**

A brief course in solid geometry, supplementary to Math. A, for students who have not had solid geometry in secondary school. Two classes a week for such part of the semester as may be necessary. Each semester.

**Math. 1. Plane Trigonometry (3).**

First semester.

**Math. 1a. Unified Mathematics (3).**

This course is designed for freshmen in the College of Arts and Science, particularly those who do not desire to specialize in mathematics. First semester.

**Math. 1b. General Mathematics for Students of Business (3).**

Review of elementary algebra, graphs and charts, the straight line law, the law of the parabola, logarithms, arithmetic and geometrical progressions, the exponential law, the power law, curve fitting, permutations, combinations, and probability. First and second semesters.

**Math. 11. Algebra and Analytic Geometry (3).**

Algebra review, theory of equations, approximate solutions of numerical equations; introduction to analytic geometry; differentiation of algebraic functions. Prerequisite: Math. 1 or 1a, or entrance credit in plane trigonometry. First and second semesters.

**Math. 11a. Solid Geometry and Analytic Geometry (3).**

Essentials of solid geometry with emphasis on mensuration; introduction to analytic geometry; differentiation of algebraic functions. Prerequisite: Math. 1 or 1a, or entrance credit in plane trigonometry. First and second semesters.

**Math. 12. Analytic Geometry and Calculus (3).**

Conic sections and curve tracing; integration with simple applications. Prerequisite: Math. 11. First and second semesters.

**Math. 13. Calculus (3).**

Transcendental functions, polar coordinates, extensive drill in the technique of integration, applications. Prerequisite: Math. 12. First and second semesters.

**Math. 14. Intermediate Calculus (3).**

Partial derivatives; multiple integrals, centroids, moments of inertia, etc.; Taylor's formula. Prerequisite: Math. 13. First and second semesters.

**Math. 15. Reading Course in Mathematics (1).**

Credit not to exceed one hour per semester, total credit not to exceed three hours; approval of program and written report required. Prerequisite: consent of the head of the department. First and second semesters.

**Math. 16. Solid and Spherical Geometry and Spherical Trigonometry (3).**

Open to all students, particularly advised for students of astronomy. Given when there is sufficient demand. First semester.

**Math. 20. Elementary Mechanics (4).**

Composition and resolution of forces, conditions of equilibrium for rigid bodies, friction, work, elementary kinematics, and kinetics. Prerequisite: Math. 1. First and second semesters.

**Math. 23. General Mathematics for Students of Business, Second Course (3).**

Fundamental ideas of analytic geometry and calculus, and selected topics of algebra, with numerous applications to problems of business and the social sciences generally. Prerequisite: Math. 1b. Second semester.

**Math. 24. General Mathematics for Students of Business, Third Course (3).**

Continuation of Math. 23. First semester.

**Math. 27. Navigation (3).**

A study of methods for the determination of the position of a ship at sea and for the determination of the course of the ship to a given destination. Marine navigation; mariner's charts; piloting; the sailings; dead reckoning; spherical trigonometry; great circle sailing; nautical astronomy; correction of observed altitudes; use of the Nautical Almanac and navigation tables; calculation of time, latitude, longitude, azimuth from observations; determination of Sumner lines of position; practice of navigation at sea. Modification of preceding methods for air navigation. Prerequisite: trigonometry.

**Math. 40. Mathematics of Finance (3).**

Compound interest, an elementary treatment of annuities, etc. Prerequisites: Math. 1a, 1b, or 11. First and second semesters.

**Math. 42. Mathematics of Statistics (3).**

Prerequisite: Math. 11 or 40. Second semester.

**Math. 43. First Course in Mathematics of Life Insurance (3).**

Mathematical theory of life contingency; preparation of life and monetary tables; computation of premiums for various life insurance policies; valuation of policies to meet statutory requirements; mathematical theory of risk and cost of insurance; computation of items for annual reports; valuation of life annuities. Prerequisite: Math. 40. First semester.

**Math. 51. Advanced Algebra (3).**

Complex numbers, theory of equations with applications to classical problems, Sturm's theorem, etc., determinants, and the theory of resultants. Prerequisite: Math. 11. First semester.

**Math. 54. Higher Geometry (3).**

An introductory course in projective geometry and non-euclidean geometry. Prerequisite: Math. 13, previously or concurrently. Second semester.

**For Advanced Undergraduates and Graduates**

**Math. 101. Vector Analysis (3).**

The theory and method of vector analysis as applied in physics and pure mathematics. Prerequisite: Math. 106. First semester.

**Math. 106. Advanced Calculus (3).**

Line and surface integrals, elementary differential equations, complex variables, Fourier series, and other selected topics. Prerequisite: Math. 14. First and second semesters.      Messrs. Fort, Smail

**Math. 111. Differential Equations (3).**

Special solvable non-linear equations, linear equations, transformations, and symbolic methods, solutions in series. Riccati's, Bessel's, and Legendre's equations. Prerequisite: Math. 106. First semester.      Mr. Shook

**Math. 112. Differential Equations and Harmonic Analysis (3).**

Continuation of Math. 111. Partial differential equations, Fourier series, and cylindrical and spherical harmonics. Second semester.      Mr. Shook

**Math. 121. Analytic Mechanics (3).**

Differential equations of motion, treatment of forces in space, free and constrained motion of a particle and of masses, with applications to practical problems. Prerequisite: Math. 106. First and second semesters.

Mr. Reynolds

**Math. 124. Theory of Errors and Least Squares, Empirical Formulas (3).**

Probability, least squares and its application in the study of errors. The formation of empirical formulas. Numerical methods. Designed for students engaged in experimental or observational work. Prerequisite: Math. 106. Second semester.

**Math. 125. Aerodynamics (3).**

Fundamentals of fluid mechanics applied to wing and propeller theory. The Prandtl theory of lift and drag. Principles of similitude with applications to wind tunnel tests. Prerequisites: *Math. 14 and 20*. First semester.

Mr. Shook

**Math. 126. Aerodynamics (3).**

Dynamics of the airplane. Climbing, gliding, and other types of flight. Theory of stability and control in preparation for work in design. Prerequisite: *Math. 125*. Second semester.

Mr. Shook

**Math. 128. Exterior Ballistics (3).**

The trajectory; air resistance; drag and cross wind coefficients; yaw; stability; equations of motion; computation of trajectories; ballistic and firing tables; rotation of the earth; probability; probability integral; probability of hitting. Prerequisite: *Math. 106 or Math. 125*. Second semester.

Mr. Raynor

**Math. 140. Higher Algebra (3).**

Linear dependence. Linear equations. Theory of matrices and linear transformation. Bilinear and quadratic forms. Theory of invariants. Second semester.

**For Graduates**

**Math. 200. Fundamental Concepts of Mathematics (3).**

Summer Session only. Mr. Fort

**Math. 209. Mathematics Seminar (3).**

Reports on special topics of the literature of mathematics and of individual research. Prerequisite: graduate standing and consent of the instructor. First semester.

Messrs. Fort, Reynolds, Smail, Raynor

**Math. 210. Mathematics Seminar (3).**

Continuation of *Math. 209*. Second semester.

Messrs. Fort, Reynolds, Smail, Raynor

**Math. 211. Infinite Processes (3).**

Fundamental limit notions applied to various infinite processes.

Mr. Fort

**Math. 212. Infinite Processes (3).**

Continuation of *Math. 211*. Second semester.

Mr. Fort

**Math. 215. Theory of Functions of a Complex Variable (3).**

First semester.

**Math. 216. Theory of Functions of a Complex Variable (3).**

Continuation of *Math. 215*. Second semester.

**Math. 217. Theory of Elasticity (3).**

Theory of stress and strain. Tension and thrust with applications. Bending of rods and plates. Equilibrium of curved rods, cylinders, and spheres. First semester.

Mr. Reynolds

**Math. 218. Theory of Elasticity (3).**

Continuation of Math. 217. Second semester.

Mr. Reynolds

**Math. 219. Selected Topics in Quantum Mechanics and Relativity (3).**

Lagrange's equations; Hamilton's partial differential equation; Schrödinger's wave equation with incidental introduction of characteristic functions of second order differential equations; the work of Dirac and others. The relativity part of the course is of the conventional type. First semester.

Mr. Lamson

**Math. 220. Selected Topics in Quantum Mechanics and Relativity (3).**

Continuation of Math. 219. Second semester.

Mr. Lamson

**Math. 221. Aerodynamics (3).**

Hydrodynamics, equations of motion, steady flow around obstacles, vortex theory. Application to wing and propeller theories, lift, and drag. Prerequisite: Math. 126. First semester.

Mr. Shook

**Math. 223. Differential Geometry (3).**

The differential geometry of curves and surfaces. Prerequisite: Math. 106. First semester.

**Math. 224. Differential Geometry (3).**

Continuation of Math. 223. The differential geometry of surfaces and Riemann spaces; tensor analysis. Second semester.

**Math. 227. Finite Differences and Difference Equations (3).**

The calculus of finite differences, the difference equation in the domain of real variables with special reference to the linear recurrent relation, boundary value and oscillation theorems, applications to mechanics and electrical theory. Prerequisite: Math. 106. First semester.

Mr. Fort

**Math. 228. Linear Difference Equations (3).**

Continuation of Math. 227. The linear difference equation in the domain of the complex variable, existence theorems, etc. Prerequisites: Math. 227 and a course in the theory of functions of a complex variable. Second semester.

Mr. Fort

**Math. 229. Advanced Analytic Mechanics (3).**

Conservative and non-conservative fields; generalized coördinates; Lagrange's equations; Hamilton's canonical equations; holonomic and non-holonomic systems; gyroscope motion, etc. Prerequisite: Math. 121. First semester.

Mr. Raynor

**Math. 230. Advanced Analytic Mechanics (3).**

Continuation of Math. 229. Second semester.

Mr. Raynor

**Math. 231. Calculus of Variations (3).**

Fundamental existence theorems of analysis. The classical theory of necessary and of sufficient conditions for relative minima of single integrals. Fields of extremals and the Hamilton-Jacobi theory. Numerous physical and mechanical applications and extensions to be chosen according to the special interests of the students. First semester.

**Math. 235. Mathematical Methods in Geophysics (3).**

Gravitational anomalies and measurements in their relations with tectonic structures and geophysical surveying. Maps of anomalies and the problem of their geological interpretation. Known methods of approximate interpretation with the aid of greatest and least values. New methods of solution by successive approximations based on the use of all observed values simultaneously. For advanced students in geology, mining, physics, and mathematics. One laboratory period (drawing and interpretation of geophysical maps) and two lectures each week. First semester. Prerequisite: *Math. 106*.

**Math. 236. Mathematical Methods in Geophysics (3).**

Continuation of Math. 235. Magnetic anomalies. Prerequisite: *Math 235*. Second semester.

**Math. 241. Theory of Functions of Real Variables (3).**

Brief discussion of the real numbers. Continuous functions, semi-continuous functions, functions of bounded variation, and other important classes. The derivative. Modern theory of measure and integration. Important inequalities. Implicit function theorem and other existence theorems of analysis. First semester.

**Math. 242. Introduction to Topology (3).**

Elements of point set topology with emphasis on applications to Euclidean spaces and spaces of functions. Combinatorial topology with applications of connectivity. Second semester.

**Math. 250. Modern Algebra (3).**

The basic concepts of algebra: groups, rings, fields and linear algebras. The structure of finite groups, including isomorphism and the Jordan-Hölder Theorem. Galois theory of equations. Applications to special problems. Second semester.

**ASTRONOMY**

The undergraduate major in mathematics and astronomy consists of at least twenty-four semester hours college credit in mathematics and astronomy. It must include Math. 1 (or 1a), 11, 12, 13, 14 and Astr. 2 and 3, except that students having entrance credit in plane trigonometry do not take Math. 1. The twelve

hours advanced credit required shall not include Math. 1, 1a, 11, 12, 13, 14, 15, 16, 20, 40 or Astr. 1.

**Astr. 1. Descriptive Astronomy (3).**

The earth as an astronomical body, the solar system, a brief introduction to sidereal astronomy. First and second semesters.

**Astr. 2. General Astronomy (3).**

The solar system, the sidereal system with an introduction to celestial mechanics and astrophysics. Prerequisite: Math. 13. Second semester.

**Astr. 3. Practical Astronomy (3).**

Instruments used: methods of taking and reducing observations to determine time, latitude, and azimuth, observatory work in which each student makes his own observations and computations in illustration of the theory studied. Prerequisites: Astr. 2, Math. 14. First semester.

**MECHANICAL ENGINEERING AND INDUSTRIAL  
ENGINEERING**

PROFESSORS F. V. LARKIN, KLEIN, AND STUART  
MR. ERDOSS

**MECHANICAL ENGINEERING**

**M.E. 1. Elementary Machine Design (3).**

Graphical statics of mechanisms and elementary strength of materials. Prerequisites: *Freshman Math., Phys., and Drawing*. First and second semesters.

**M.E. 2. Elementary Heat Engines (3).**

Elementary thermodynamics, properties of steam, power plant auxiliaries, heat engine cycles, fuels, boilers, steam engines, steam turbines, internal combustion engines. Prerequisites: *Freshman Math., Phys., and Chemistry*. First and second semesters.

**M.E. 4. Elementary Machine Design (3).**

Continuation of M.E. 1 with kinematics and design calculations for simple machine elements such as cams and gears. Prerequisite: *Freshman Math., Phys., and Drawing*. Second semester.

**M.E. 5. Heat Engines (3).**

Continuation of M.E. 2. Prerequisites: *Freshman Math., Phys., and Chemistry*. Second semester.

**M.E. 9. Engineering Laboratory (1).**

Use and calibration of instruments; elementary tests on steam engines, pumps, and boilers. Prerequisite: M.E. 2. Fee, \$6.00. First semester.

**M.E. 11. Engineering Laboratory (1).**

Continuation of M.E. 9. Laboratory experiments of flow of fluids, tests of steam engines, turbines, and compressors, heat transfer equipment, internal combustion engines. Prerequisite: *M.E. 2.* Fee, \$6.00. Second semester.

**M.E. 15. Thesis (3).**

Candidates for the degree of B.S. in M.E. may, with the approval of the department staff, undertake a thesis as a portion of the work during the senior year. Prerequisites: *C.E. 32, M.E. 33.* First or second semester.

**M.E. 19. Engineering Laboratory (1).**

A one semester course for non-mechanical students, covering principles of measurements, tests of boilers, steam engines, steam turbines, air compressors, internal combustion engines. Prerequisite: *M.E. 2, or equivalent.* Fee, \$6.00. First and second semesters.

**M.E. 21. Engineering Laboratory (1).**

For non-mechanical students. Use and calibration of instruments, tests of steam engines, steam turbines, boilers, and compressors, internal combustion engines, pumping equipment. Prerequisite: *M.E. 22 or equivalent.* Fee, \$6.00. First semester.

**M.E. 22. Heat Engines (3).**

For non-mechanical students. Fuels, combustion, engineering, thermodynamics, properties of steam, steam power plant equipment and cycles, internal combustion engines. Prerequisites: *Math. 13 and Phys. 23 previously or concurrently.* First semester.

**M.E. 23. Heat Engines (3).**

Continuation of M.E. 22. Prerequisites: *Math. 13 and Phys. 23 previously or concurrently.* Second semester.

**M.E. 25. Engineering Laboratory (1).**

Continuation of M.E. 21. Prerequisite: *M.E. 22 or equivalent.* Fee, \$6.00. Second semester.

**M.E. 29. Heat Engines (3).**

A one semester course for non-mechanical students. Combustion, properties of steam, power plant equipment, internal combustion engines. Prerequisite: *Math 13 and Phys. 23 previously or concurrently.* First and second semesters.

**M.E. 33. Thermodynamics (2).**

Energy operations, entropy, flow of fluids, power plant cycles, application of principles to steam power equipment and to compressors. Prerequisite: *M.E. 2 or equivalent.* First and second semesters.

**M.E. 35. Internal Combustion Engines (2).**

Thermodynamics of internal combustion engine cycles, spark and compression ignition engines, carburetion, fuel injection, special problems of the Diesel engine. Prerequisite: *M.E. 5.* Second semester.

**M.E. 40. Machine Design (3).**

Strength and kinematics in the design of machine elements including fastenings, springs, flywheels, and gears. Elementary study of vibration and balancing. Prerequisite: M.E. 1. First and second semesters.

**For Advanced Undergraduates and Graduates**

Graduate students desiring to take the following courses should present as prerequisites: integral calculus, mechanics of materials, and elementary heat engines.

**M.E. 100. Theoretical Naval Architecture (3).**

Ship lines, displacement, buoyancy, stability, coefficients. Froude's law of model testing. Taylor's standard series, speed and power of ships. Prerequisite: *senior standing in engineering*. Second semester. Mr. Stuart

**M.E. 114. Engineering Laboratory (2).**

Comprehensive tests of power plant equipment, internal combustion engines, refrigeration machinery. Prerequisite: M.E. 9. Fee, \$6.00. First semester. Messrs. Stuart, Jackson

**M.E. 116. Mechanics of Compressible Fluids (3).**

Study of the behavior of real fluids. Physical properties of fluids, viscometry. Laws of dynamic similitude and use of dimensionless parameters. Laminar and turbulent flow. Flow of compressible fluids through pipes, orifices and curved channels, lubrication and heat transfer. Prerequisite: *senior or graduate standing in engineering*. Second semester.

Mr. Stuart

**M.E. 117. Air Conditioning and Refrigeration (3).**

Application of thermodynamics to fields of refrigeration, air conditioning, heating, ventilating. Study of typical systems. Advanced work in heat transfer and flow of fluids. Prerequisite: M.E. 33. First semester.

Mr. Klein

**M.E. 118. Engineering Laboratory (2).**

Continuation of M.E. 114 supplemented by complete tests of power plants in the vicinity and original investigations. Prerequisite: M.E. 9. Fee, \$6.00. Second semester.

Mr. Stuart

**M.E. 119. General Aeronautics (3).**

A theoretical course in aeronautics, including aerodynamics of the airplane and propeller, also navigation and navigating instruments. Prerequisite: *senior standing in the college of engineering*. First semester.

**M.E. 120. Aeronautical and Automotive Engines (3).**

Thermodynamic and mechanical design features, carburetors, superchargers, and accessories, air and liquid cooling, spark and compression ignition; performance under varying operating conditions. Prerequisite: *senior standing in the College of Engineering; M.E. 33 or equivalent*. Second semester.

**M.E. 121. Advanced Machine Design (3).**

Vibration and balancing of machines, advanced strength of materials, elementary study of lubrication. Prerequisites: M.E. 40, C.E. 32. First semester.

**M.E. 122. Advanced Machine Design (3).**

Advanced problems in machine design. Prerequisites: M.E. 40, C.E. 32. Second semester.

**M.E. 123. Power Plants (3).**

A study of the relation of the various pieces of power plant equipment to each other. Calculations for the design of power plant elements. Comparison of different types of plants driven by both steam and internal combustion engines. Utilization of exhaust heat. Prerequisite: M.E. 33 or equivalent. Second semester.

Mr. Klein

**M.E. 125. Air Conditioning (3).**

Continuation of M.E. 117. Advanced work in the field of air conditioning. Design of typical systems based on fundamental laws of heat transfer and fluid flow. Study of automatic methods of controlling temperature and humidity. Classroom and laboratory work. Prerequisite: M.E. 117 or equivalent. Second semester.

Mr. Klein

**M.E. 134. Plant Proseminar (1).**

Proseminar covering the material of M.E. 114, concerned primarily with trips to industrial plants and discussions of mechanical processes and equipment. Prerequisite: M.E. 9. First semester.

Messrs. Larkin, Stuart

**M.E. 138. Plant Proseminar (1).**

Continuation of M.E. 134 but covering the material in M.E. 118. Prerequisite: M.E. 9. Second semester.

Messrs. Larkin, Stuart

**M.E. 141. Machine Analysis Laboratory (1).**

Laboratory balancing of rotating equipment; stroboscopic study of machine operation; studies in suitability of materials. Prerequisite: M.E. 40. First semester.

Students taking any of the courses in engineering laboratory are subject to call for one twenty-four hour test a semester.

**For Graduates**

Math. 217 and 218, Theory of Elasticity, Math. 221, Aerodynamics, and E.E. 217 and 218, Economics of Electric Power, may be included in a graduate major in mechanical engineering.

**M.E. 200. Advanced Engineering Thermodynamics (3).**

Energy equations; availability and entropy; general equations; formulation of vapor properties; action of steam in nozzles and turbines; supersaturation, gas properties; gas reactions in combustion. Prerequisite: graduate standing in engineering. First semester.

Messrs. Klein, Stuart

**M.E. 201. Advanced Engineering Thermodynamics (3).**

Continuation of M.E. 200. Prerequisite: *graduate standing in engineering.* Second semester. Messrs. Klein, Stuart

**M.E. 203. Internal Combustion Engines (3).**

History: laws of mixing, carburetion, atomization, combustion, and chemical equilibrium; heat losses; friction losses; governing; gas engine cycles; vibration and balancing; engine types. Prerequisite: *graduate standing in engineering.* First semester

**M.E. 204. Internal Combustion Engines (3).**

Continuation of M.E. 203. Prerequisite: *graduate standing in engineering.* Second semester.

**M.E. 207. Steam Turbines (3).**

Theory of the steam turbine; classification; discussion of types; operation and governing; principles underlying the design of turbine parts; critical velocities: Prerequisite: *graduate standing in engineering.* First semester. Mr. Klein

**M.E. 208. Steam Turbines (3).**

Continuation of M.E. 207. Prerequisite: *graduate standing in engineering.* Second semester. Mr. Klein

**M.E. 211. Advanced Engineering Laboratory (3).**

Original investigations and advanced testing in the field of mechanical engineering preceded by a study of the methods of precision measurements required. Prerequisites: *graduate standing in engineering, courses in engineering laboratory and thermodynamics.* Fee, \$6.00. First semester. Mr. Stuart

**M.E. 212. Advanced Engineering Laboratory (3).**

Continuation of M.E. 211. Prerequisites: *graduate standing in engineering, courses in engineering laboratory and thermodynamics.* Fee, \$6.00. Second semester. Mr. Stuart

**M.E. 216. Advanced Mechanics of Compressible Fluids (3).**

Boundary layer theory. Action of compressible fluids in compressors, fans, steam turbines, and other mechanical equipment. Heat transfer and lubrication. Prerequisite: *M.E. 116 or equivalent.* Second semester.

Mr. Stuart

**INDUSTRIAL ENGINEERING**

**I.E. 1. Industrial Employment.**

Following the junior year, students are required to do a minimum of eight weeks of practical work, preferably as student apprentices, in the work they plan to follow after graduation. A report, typewritten and bound, is required. Prerequisite: *sophomore standing.* Not offered in 1943-44.

**I.E. 2. Industrial Management (3).**

A course in the essential problems of organization, financial administration, plant layout, production control, and employment policies of industrial enterprises. Prerequisites: *Eco. 3 and 4*. First semester.

**I.E. 3. Industrial Management (3).**

Continuation of I.E. 2. Prerequisites: *Eco. 3 and 4*. Second semester.

In I.E. 2 and I.E. 3 a maximum of three half-days inspection trips a semester is required.

**I.E. 5. Thesis (3).**

Candidates for the degree of B.S. in Industrial Engineering may, with the approval of the department staff, undertake a thesis as a portion of the work of the senior year. Prerequisites: *C.E. 32, Acctg. 4*. First and second semesters.

**I.E. 13. Industrial Engineering (3).**

A study of the engineering and economic problems arising in manufacturing industries. Lectures, problem exercises, trips, and collateral reading. Prerequisites: *Eco. 3, M.E. 1, and M.E. 5*. First and second semesters.

**For Advanced Undergraduates and Graduates**

**I.E. 111. Industrial Administration (3).**

A management study of the industrial organization, its formation, duties, authority, responsibility and control. Lectures and drawing room problems or proseminar. Prerequisite: *I.E. 13*. First semester.

Mr. Larkin

**I.E. 112. Personnel Administration (3).**

A management study of the personnel organization, its employment, training, safety and reward. Lectures and drawing room problems or proseminar. Prerequisite: *I.E. 13 or equivalent*. Second semester.

Mr. Larkin

**I.E. 121. Experimental Industrial Engineering (3).**

Experimental projects in selected fields of Industrial Engineering approved by the instructor. A written report is required. Prerequisites: *senior standing in Industrial or Mechanical Engineering, I.E. 13, and consent of the instructor*.

Mr. Larkin

**I.E. 122. Experimental Industrial Engineering (3).**

Continuation of I.E. 121. Prerequisites: *senior standing in Industrial or Mechanical Engineering, I.E. 13, and consent of the instructor*.

Mr. Larkin

**For Graduates**

Candidates for the degree of Master of Science with a major in industrial engineering may include in their program graduate courses in engineering and psychology for which they have the necessary prerequisites: also Math. 217, 218, 221. The major must include a minimum of twelve hours of graduate courses

in technical engineering, at least six of which must be in industrial engineering. A thesis may be required. The collateral work will normally be taken in the College of Business Administration.

**I.E. 200. Management Policies (3).**

Analysis of the factors entering into the determination of management policies. Discussion of case material bearing upon the organization, location, growth, size, socialization, and control of types of industries. Prerequisite: *elementary courses in industrial management*. First semester.

Mr. Larkin

**I.E. 201. Personnel Policies (3).**

Analysis of the factors entering into the determination of personnel policies. Discussion of case material bearing on the worker and his relation to industry, selection, health, training, safety, wages, welfare, and retirement. Prerequisite: *six hours in industrial management*. Second semester.

Mr. Larkin

**METALLURGICAL ENGINEERING**

PROFESSORS DOAN, AND BUTTS

MR. STOUT

**Met. 2. Metallurgy of Iron and Steel (2).**

Same as Met. 52, but without plant visits or laboratory exercises. Prerequisites: Met. 21 or 7. Second semester.

**Met. 3. Metallurgy of Copper, Lead, and Associated Metals (2).**

Same as Met. 53, but without plant visits or laboratory work. Prerequisites: Met. 21 or 7. First semester.

**Met. 7. Introduction to Metallurgy (2).**

The history and principal modern processes of metallurgy. Ores, fuels, combustion, pyrometry, refractories, welding, and furnaces. Lectures, laboratory exercises, and plant visits. Prerequisites: Chem. 1 or 3, Phys. 22. Fee, \$5.00. First semester.

**Met. 8. Introduction to Metallurgy (2).**

Continuation of Met. 7. The application of physics and chemistry to the principal metallurgical operations. Lectures and metallurgical problems. Prerequisite: Met. 7.

**Met. 21. Engineering Metallurgy (2).**

An abridgment of Met. 7, 52, 53, and 54, especially adapted to the viewpoint of users of metals. Prerequisites: Chem. 1 or 3, Phys. 22. First and second semesters.

**Met. 33. Metallurgical Laboratory (1).**

The internal structure and properties of metals and industrial alloys; effect of cold working and heat treatment. Welding. Use of instruments and apparatus employed in metallurgical work. Prerequisites: Phys. 23 and 24, Met. 21, previously or concurrently. Fee, \$5.00. First semester.

**Met. 34. Metallurgical Laboratory (1).**

Continuation of Met. 33. Prerequisites: Phys. 23 and 24, Met. 7 or 21, previously or concurrently. Fee, \$5.00. Second semester.

**Met. 49. Summer Work.**

At the end of the junior year students in the curriculum of metallurgical engineering who do not take Mil. 9 or 19 are required to secure in industrial plants at least eight weeks' practical experience. Not offered in 1943-44.

**Met. 52. Metallurgy of Iron and Steel (3).**

Chemical and physical properties of iron and steel. Manufacturing processes. Lectures and daily questions on text book, plant visits, and laboratory exercises. Prerequisites: Met. 7 or 21. Fee, \$5.00. Second semester.

**Met. 53. Metallurgy of Copper, Lead, and Associated Metals (3).**

Production processes and properties of copper and its alloys, lead and its alloys, gold, silver, platinum, selenium and tellurium, bismuth. Lectures, written exercises on textbook assignments, plant visits and laboratory work, with formal written reports thereon. Two- or three-day inspection trip (expense about \$10.00) is required. Prerequisite: Met. 7 and 8 or 21. First semester.

**Met. 54. Metallurgy of Zinc, Aluminum, and the Minor Metals (2).**

Production processes and properties of aluminum and its alloys, zinc, tin, nickel, gold, silver, mercury, antimony, etc. A one-day inspection trip (expense about \$3.00) is required. Prerequisite: Met. 7 and 8, or 21. Second semester.

**Met. 62. Problems in Iron and Steel Metallurgy (1).**

A course of problems involving the fundamental principles of the various processes in the metallurgy of iron and steel to give the student an understanding of the quantitative relationship in the processes. Prerequisites: *Met. 52 or 21, previously or concurrently; Met. 8 or 81.* Second semester.

**Met. 81. Short Course in Metallurgical Engineering Problems (1).**

An abridgement of the problem work of Met. 8 and 62. Prerequisites: *Chem. 8; Met. 7 or 21, previously or concurrently.* First and second semesters.

**Met. 91. Thesis in Metallurgy (3).**

Candidates for the degree of B.S. in Metallurgical Engineering may, with the approval of the head of the department, undertake a thesis as a portion of the work during the senior year. Deposit, \$10.00. First or second semester.

**For Advanced Undergraduates and Graduates**

**Met. 108. Electrometallurgy (3).**

The practical application of electricity to metallurgical processes; electroplating and electric furnace plants and practice. Lectures and laboratory work. Prerequisites: *Met. 7 or 21*; *Met. 8* and *125*. Second semester.

Mr. Butts

**Met. 125. Electrochemistry and Electrometallurgy (2).**

Lectures and written recitations concerning current and voltage in electrolysis, energy relations, electrode reactions, primary cells and storage batteries; electric furnaces, and practical applications of electricity to metallurgical processes. Prerequisites: *Chem. 20*, *Met. 7 or 21*, *Phys. 24*. First semester.

Mr. Butts

**Met. 130. Physical Metallurgy (3).**

The states of matter; physical structure and constitution of metals; X-rays and crystal structure; effect thereon of mechanical working, heat treatment and composition. Casting, shaping, welding, and testing metal objects. Lectures and laboratory work. Prerequisites: *Chem. 1 or 8*, *Phys. 22*; *Met. 7 or 21*. Fee, \$5.00. Second semester.

**Met. 131. Metallography (3).**

Internal structures of alloys and the constitutional diagram. The relation between structure and properties in industrial alloys. Quenching and aging. Lectures, problems, and laboratory experiments. Prerequisites: *Chem. 1 or 3*, *Phys. 22*; *Met. 7 or 21*, and *130*. Fee, \$5.00. First semester.

Mr. Doan

**Met. 135. Electrochemical Laboratory (1).**

Quantitative relations in the deposition of metals by electrolysis. Experimental study of the conditions controlling the nature of electrolytic deposits, electrolysis of fused salts, cathodic and anodic reactions. Prerequisites: *Chem. 36*, *Met. 7 or 21*, *Phys. 24*, *Met. 125*, previously or concurrently. Fee, \$5.00. First semester.

Mr. Butts

**Met. 139. Metallurgical Colloquium (1).**

An opportunity for the student to develop (1) an acquaintance with the current metallurgical literature, (2) the ability to interpret it clearly, and (3) skill in presenting oral engineering reports. Prerequisite: *Met. 7 or 21*; *Met. 52* and *130*. First semester.

Mr. Doan

**Met. 140. Metallurgical Colloquium (1).**

Continuation of *Met. 139*. Prerequisites: *Met. 139*. Second semester.

Mr. Doan

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**Met. 152. Advanced Metallurgy of Iron and Steel (3).**

Continuation of Met. 52, for seniors and graduate students. Lectures, plant visits, laboratory exercises, written reports. Prerequisite: Met. 52. Second semester. Mr. Stout

**Met. 163. Problems in the Metallurgy of Copper, Lead, Gold, and Silver (1).**

A course of problems concerned with the principles utilized in the metallurgy of copper, lead, silver, and gold. Prerequisites: *Met. 8 or 81, and 53, previously or concurrently; Met. 62.* First semester. Mr. Butts

**Met. 164. Problems in the Metallurgy of Zinc, Aluminum, and the Minor Metals (1).**

A course of problems concerned with the principles utilized in the metallurgy of zinc, aluminum, etc. Prerequisites: *Met. 8 or 81, and 54, previously or concurrently; Met. 62 and 163.* Second semester. Mr. Butts

**Met. 176. Elective Projects in Metallurgy (3).**

An opportunity for the advanced student to undertake an independent investigation in a metallurgical field of his own choice. Assistance will be given only when the student requests it. The project may be either a comprehensive literature investigation, a theoretical study, or one involving laboratory experiment. The project must receive approval of the department before work is begun. First semester.

Messrs. Doan, Butts, Stout

**Met. 177. Elective Projects in Metallurgy (3).**

Continuation of Met. 176. Second semester.

Mr. Doan

**For Graduates**

NOTE: Not all of the courses listed below will be given in any one year. Those to be given will be determined by the number of applicants at the beginning of the semester; if the number is less than six, the course may be omitted.

**Met. 201. Metallurgical Investigation and Thesis (4-6).**

Investigation of some special metallurgical problems, such as: an improvement or innovation in some metallurgical process; the establishment of an equilibrium diagram; the effect of heat treatment on a metal or alloy. Study of the literature. The study and investigation must be embodied in a written report. Prerequisite: undergraduate metallurgical course in the field of investigation. First and second semesters.

Messrs. Doan, Butts

**Met. 202. Metallurgical Investigation and Thesis (3).**

Continuation of Met. 201. First and second semesters.

Messrs. Doan, Butts

**Met. 203. Advanced Electrometallurgy (3).**

Specialized study in some particular field of electrochemistry or electrometallurgy selected by the student, such as electrode reactions, thermodynamics of electrolysis, electroplating, electrolytic refining, electrothermics, electrothermal efficiencies, industrial processes. Prerequisite: Met. 125. First and second semester.

Mr. Butts

**Met. 205. Non-ferrous Metallurgy (3).**

Detailed study of the metallurgy of any one or more of the non-ferrous metals, including historical evolution, reading of references on modern practices, and theoretical consideration of the possibilities of future development in manufacture or use. Both chemical and physical metallurgy of the alloys may be included. Prerequisite: a course in non-ferrous metallurgy. First or second semester.

Mr. Butts

**Met. 208. The Phase Rule (3).**

Heterogeneous equilibria in binary and ternary alloy systems in the light of the phase rule. Construction and interpretation of ternary constitutional diagram models. Prerequisites: Met. 131, facility in reading German. First or second semester.

Mr. Doan

**Met. 210. The Physical Chemistry of the Metals (3).**

The principal fields of physical chemistry in their relation to the extraction of metals from their ores, the refining, alloying, heat treatment, welding, coating and corrosion of metal systems. Prerequisites: one undergraduate course in physical chemistry; and elementary ferrous or non-ferrous metallurgy, or Met. 130 and 131; facility in reading German. First or second semester.

Mr. Doan

**Met. 211. The Principles of Modern Welding (3).**

The foundations in scientific principle upon which the welding processes rest; the present limitations of the various processes; the trends in new developments; the engineering, industrial, and commercial aspects of welding. Prerequisite: Met. 130 and 131. First or second semester.

Mr. Doan

**Met. 212. Radiography in Principle and Practice (3).**

The principles of radiography. X-rays and gamma rays. Industrial practices. Prerequisites: Phys. 122 and Met. 130. First or second semester.

Mr. Doan

**Met. 215. Stainless Steels (3).**

Special problems relating to the making, rolling, finishing, fabricating, and welding of corrosion resistant and heat resistant alloys of iron with chromium and additional alloying elements commonly used. Equilibrium diagrams of iron and chromium with and without other elements sometimes added to stainless steel, such as nickel, molybdenum, etc. The properties of the different typical alloys and their uses in industry and modern civilization. Prerequisites: ferrous metallurgy; and previously or concurrently, Met. 130, 131, and 152. First or second semester.

**Met. 219. Alloy Steels (3).**

Alloy steels other than chromium and nickel, especially alloys with manganese, silicon, molybdenum, vanadium, tungsten. High speed steels, steels for electromagnets and permanent magnets. Ternary and quaternary alloy steels for heat treating, especially for automotive, airplane, and special machinery parts. Prerequisites: ferrous metallurgy; and, previously or concurrently, Met. 130, 131, and 152. First or second semester.

Chem. 236 and 237, X-ray Research, may be included in a graduate major in metallurgy.

**MILITARY SCIENCE AND TACTICS**

COLONEL EASTERDAY

CAPTAIN FOSTER

MASTER SERGEANT GASDA, STAFF SERGEANT WOCKENFUSS

An infantry unit of the Reserve Officers' Training Corps was established at Lehigh University in September, 1919, and an ordnance unit was established in September, 1925. By action of the trustees and faculty of the University the basic course, military science and tactics, was made a required subject for physically fit freshman and sophomores, except that students who have served three months or more in any branch of the armed forces of the United States, between September 1940 and a date which shall mark six months beyond the end of the current war, are relieved of this requirement, and are not compelled to substitute academic work therefor.

The military courses are conducted under War Department regulations and consist of three semesters of basic work common to infantry and ordnance, and two years of advanced work along specialized lines. Students are selected to pursue the advanced courses on the basis of their proficiency in leadership and scholarship displayed during the basic course. Selections for the ordnance course are usually confined to students in mechanical, chem-

ical, metallurgical, and electrical engineering, and engineering physics. The number selected for the Advanced courses is limited by War Department funds made available annually.

Provision is made for students electing the advanced courses to substitute them for work which would otherwise be required in their respective curricula. Students who complete the four-year course satisfactorily become eligible for basic training in a branch service school and upon completion of that course become eligible for commissions as second lieutenants in the Officers' Reserve Corps.

Uniforms and equipment are furnished by the government to basic students, but each student must provide suitable shoes. A cash deposit of \$25.00 is required, payable at the time of registration and refunded in full upon the return of the property issued by the department. Advanced course students are paid commutation of uniform and subsistence which is more than sufficient to cover the purchase of their officers' uniform and equipment.

#### Basic Courses

##### **Mil. 21. Basic Course, First Semester (3).**

Fundamental military training common to all arms of the service. Theoretical and practical instruction in military hygiene and first aid, military courtesy and discipline, organization of the army, wearing and proper care of the uniform, interior guard duty and safeguarding military information, and dismounted drill. Three recitations and two drill periods a week. Each semester.

##### **Mil. 22. Basic Course, Second Semester (3).**

Fundamental military training common to all arms of the service. Theoretical and practical instruction in map reading, mechanics of the M1 rifle and rifle marksmanship, and dismounted drill. Three recitation and two drill periods a week. Each semester.

##### **Mil. 23. Basic Course, Third Semester (3).**

Fundamental military training common to all arms of the service. Theoretical and practical instruction in concealment and camouflage, cover and movement, scouting and patrolling, marches and bivouac, chemical warfare, associated arms, and dismounted drill. Three recitation and two drill periods each week. Each semester.

#### Infantry Unit

##### **Mil. 5. Advanced Infantry, First Year (3).**

Theoretical and practical instruction in leadership, airplane, photographs, infantry weapons (machine gun, 37 mm. and infantry mortars),

combat principles, rifle and machine gun section and platoon, military administration, defense against chemical warfare, and care and operation of motor vehicles. Students who indicate suitable proficiency in this course are appointed sergeants in the R. O. T. C. unit. Three recitations and one drill period a week. First semester.

**Mil. 6. Advanced Infantry, First Year (3).**

Continuation of Mil. 5. Second semester.

**Mil. 7. Advanced Infantry, Second Year (3).**

Theoretical and practical instruction in mechanization and motorization, organized Reserve Corps regulations, military history and national defense policy, combat principles, tactical exercises, map problems, leadership, military law, tanks, anti-aircraft and anti-tank defense, combat intelligence, and infantry signal communications. Students who indicate suitable proficiency in this course are appointed commissioned officers in the R. O. T. C. unit. Upon graduation they are eligible for basic training in an army branch service school. Upon completion of this school, students are appointed second lieutenants in the Infantry Officers' Reserve Corps. Three recitations and one drill period a week. First semester.

**Mil. 8. Advanced Infantry, Second Year (3).**

Continuation of Mil. 7. Second semester.

**Ordnance Unit**

**Mil. 15. Advanced Ordnance, First Year (3).**

Theoretical and practical instruction in leadership, material, ammunition and explosives, current ordnance problems. Organization of the ordnance department, defense against chemical warfare, aerial photographs, and military administration. Students who indicate suitable proficiency in this course are appointed sergeants in the R.O.T.C. unit. First semester.

**Mil. 16. Advanced Ordnance, First Year (3).**

Continuation of Mil. 15. Second semester.

**Mil. 17. Advanced Ordnance, Second Year (3).**

Theoretical and practical instruction in leadership, property accounting and ordnance financial procedure, military law, industrial mobilization, current ordnance problems, military history and policy, O. R. C. regulations, and ordnance field service. Students who indicate suitable proficiency in this course are appointed officers in the R.O.T.C. unit and upon graduation they are eligible for basic training in an army branch service school. Upon completion of this school students are appointed second lieutenants in the Ordnance Officers' Reserve Corps. Three recitations and one drill period a week. First semester.

**Mil. 18. Advanced Ordnance, Second Year (3).**

Continuation of Mil. 17. Second semester.

**MINING ENGINEERING**

PROFESSOR CALLEN  
ASSISTANT PROFESSOR GALLAGHER

**Min. 6. Mine Surveying (3).**

Forms for notes; surface surveys; determination of true meridian, latitude, and time from observations on Polaris and sun; U. S. public land and mineral land surveys; connecting surface with mine surveys through tunnels, slopes, and shafts; calculation of notes; mine mapping, mine problems; practice in mine surveying. Prerequisite: *C.E. 6a.* Second semester.

**Min. 8. Oil Field Practice (2).**

Distribution of petroleum and natural gas; valuation of oil lands. Location of wells; development-drilling, production methods. Transportation; storage; fires; avoidable waste, conservation of oil and gas resources. Refining methods; casing-head gasoline. Prerequisites: *Geol. 10, Phys. 23, 24.* Second semester. (Not offered 1944-45).

**Min. 10. Fuel Technology (2).**

Solid fuels: sampling; proximate and ultimate composition of coals, calorific values, fusibility of ash; classification of coal; carbonization, both low- and high-temperature; gasification of fuel. Prerequisite: *one year of college chemistry.* First semester.

**Min. 12. Fuel Technology Laboratory (1).**

Coal and gas analysis, calorimetry, pyrometry, testing coals for yield of distillation products at low and high temperatures; extraction of coal by solvents. Prerequisites: *Chem. 36 and 48 or equivalent; Min. 10 concurrently.* Deposit, \$10.00. First semester.

**Min. 15. Mining Engineering (3).**

A survey of the elements of mining engineering for students in curricula other than mining engineering. Prospecting, boring, excavation, support, mining methods, transportation, drainage, ventilation, lighting, mineral preparation. Prerequisite: *junior standing.* Both semesters.

**Min. 21. Mining Fundamentals (3).**

Methods of prospecting; drilling, explosives, and blasting; tunneling, slope- and shaft-sinking; timbering; machines for cutting and loading. Prerequisites: *Geol. 10, Math. 13, Phys. 24; C.E. 9* concurrently. First semester.

**Min. 22. Methods of Mining (3).**

The methods of working bedded and vein deposits with special attention to principles involved in the selection of a mining method and to mechanization. Prerequisite: *Min. 21.* Second semester.

**For Advanced Undergraduates and Graduates**

**Min. 103. Mine Ventilation (3).**

A study of mine atmospheres, and gases produced or encountered in mining operations; distribution and control of the ventilating current to meet requirements of safe and efficient operation; mine fires and explosions. Prerequisites: *Min. 22 and C.E. 13.* First semester. Mr. Callen

**Min. 104. Haulage, Hoisting, and Pumping (3).**

The fundamentals of basic design, selection, and application of equipment for transportation of mineral products from working face to surface plant; sources, control, and disposal of mine water. Prerequisites: *Min. 22, C.E. 13, E.E. 50 and M.E. 29.* Second semester. Mr. Callen

**Min. 105. Mine Administration (2).**

Mining law; mine organization and management; wage systems and trade agreements; mine safety organization and regulation; special aspects of workmen's compensation laws; personnel administration. Prerequisite: *Min. 22.* First semester. Mr. Gallagher

**Min. 106. Mining Economics (3).**

Systematic exploration and examination; theory and methods of sampling; reserves; mine taxation; depreciation and depletion; valuation and reports. Prerequisites: *Acctg. 4, Min. 22 and 107.* Second semester.

Mr. Calien

**Min. 107. Ore Dressing, Coal Preparation and Laboratory (3).**

Recovery of minerals from ores; machines and apparatus used for coarse and fine crushing; classifying and preparation for concentration; methods of concentration, including gravity and magnetic methods, flotation, etc. Treatment of ores in concentrating plants; visits to mills; experimental work in ores; principles of concentration applied to the preparation of coal. Visit to breakers and coal washers. Prerequisites: *Geol. 1 or 2, Phys. 23, 24, Chem. 36, Min. 22.* Fee, \$5.00. First semester.

Mr. Gallagher

**Min. 108. Advanced Mineral Preparation (2).**

An extension of the study of fundamental theories of mineral preparation begun in Min. 107, with special reference to flotation of metallic and non-metallic minerals; design of flow sheets based on results of laboratory tests. Prerequisites: *Min. 107.* Deposit, \$10.00. Second semester.

**For Graduates**

Students desiring to do graduate work in mining engineering should consult with the head of the department with regard to their qualifications.

**Min. 201. Methods of Mining (3).**

Study of methods used in a given mining region or in the production of a given class of materials, with respect to conditions influencing choice of method and cost. First semester. Mr. Gallagher

MORAL AND RELIGIOUS PHILOSOPHY

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**Min. 202. Methods of Mining (3).**

Continuation of Min. 201. Second semester.

Mr. Gallagher

**Min. 203. Mining Plant (3).**

The determination of the efficiency of mining machinery of given types under varying conditions. First semester.

Mr. Callen

**Min. 204. Mining Plant (3).**

Continuation of Min. 203. Second semester.

Mr. Callen

**Min. 205. Ore-Dressing and Coal Washing Plant (3).**

Study of operations in dressing ores and preparation of coal. Efficiency of machines and processes. Losses in dressing. Fee, \$5.00. First semester.

Mr. Gallagher

**Min. 206. Ore-Dressing and Coal Washing Plant (3).**

Continuation of Min. 205. Fee, \$5.00. Second semester.

Mr. Gallagher

**MORAL AND RELIGIOUS PHILOSOPHY**

PROFESSOR BEARDSLEE

As a prerequisite to graduation, the University requires all of its students to take a one-hour course in the basic problems and theories of the philosophy of conduct and the philosophy of religion in order that they may acquire some familiarity with the best thought concerning the moral and spiritual problems of men. The emphasis is continually upon the certainties of knowledge and faith by which men live. The purpose is constructively to help the student to clarify and enrich his own living philosophy of life.

This requirement must be met by satisfactory completion of M.R.Phil. 10. Although this course does not carry semester hour credit toward graduation, the grade received is counted in determining the scholastic average of the student.

The courses listed below as carrying semester hour credit may be chosen as free electives and when so elected carry semester hour credit toward graduation, but none of them may be selected as a substitute for the Moral and Religious Philosophy requirement.

**M.R.Phil. 10. Student Philosophy.**

Analysis of basic student problems and beliefs in moral and religious experience, in the construction of personal philosophies of conduct and religion. First and second semesters.

**M.R.Phil. 12. Philosophy of Conduct (1).**

Analysis of such problems as: the terms good and bad, right and wrong; the sources of moral distinctions; responsibility and freedom; progress; happiness. Prerequisite: M.R.Phil. 10. First and second semesters.

**M.R.Phil. 13. Philosophy of Conduct (1).**

Historical and case study of systems of ethics. First semester.

**M.R.Phil. 14. Philosophy of Conduct (1).**

Continuation of M.R.Phil. 13. Prerequisite: M.R.Phil. 13. Second semester.

**M.R.Phil. 16. Philosophy of Religion (1).**

A study of the origin, nature and validity of religious experience. Prerequisite: M.R.Phil. 10. First and second semesters.

**M.R.Phil. 17. Comparative Religion (1).**

Philosophical study of the source materials and authoritative expositions of living religions in order to orient the student's own convictions in the varieties of effective faith. Prerequisite: M.R.Phil. 10. First and second semester.

**M.R.Phil. 18. Comparative Religion (1).**

Continuation of M.R.Phil. 17. Prerequisite: M.R.Phil. 17. Second semester.

**For Advanced Undergraduates and Graduates**

**M.R.Phil. 100. Proseminar (3).**

Selected problems in ethics and the philosophy of religion. Individual conferences and seminar discussions of teacher and student reports. The instructor emphasizes current attempts to relate man to the rest of the universe and students are encouraged to make similar syntheses. First semester.

Mr. Beardslee

**M.R.Phil. 101. Proseminar (3).**

Selected problems in ethics and the philosophy of religion. Continuation of M.R.Phil. 100. Second semester.

Mr. Beardslee

**MUSIC**

PROFESSOR SHIELDS

**Mus. 3. History and Appreciation of Music (1).**

A study of the development of music from early civilization to the end of the formal period. Illustrated. First semester.

**Mus. 4. History and Appreciation of Music (1).**

A study of the music of the romantic period; nationalism and modern tendencies in music. Illustrated. Second semester.

**Mus. 5. Harmony (3).**

A study of the selection and the progression of chords. Prerequisite: some knowledge of music. Students should consult the instructor before registering for the course. First semester.

**Mus. 6. Harmony (3).**

Continuation of Mus. 5 and the study of modulation. Second semester

**Mus. 7. Counterpoint (2).**

A study of the art of writing melody against melody in two voices, strict counterpoint in each of the five species. Prerequisite: harmony. First semester.

**Mus. 8. Counterpoint (2).**

Continuation of Mus. 7 in three and four part counterpoint, strict and free. Study of canon and fugue. Second semester.

**THE LEHIGH UNIVERSITY BAND**

Band may be elected by suitably qualified freshmen and sophomores in place of military science and tactics. It is an optional subject for suitably qualified juniors and seniors. The band is drilled according to the methods prescribed for regular army bands by one of the sergeants designated for that purpose by the head of the department of military science and tactics.

The band is required to participate in military ceremonies when called upon by the professor of military science and tactics, and to attend all football games played at home and not more than ten other home games, to be specified by the director of athletics. When it appears for military ceremonies the band is to be considered an integral part of the R. O. T. C. regiment.

Coat and cap of uniform, musical instruments, and music are furnished by the University. Members of the band furnish white flannel trousers. A deposit of \$25.00 is required from each member of the band for an instrument or uniform.

Seniors and juniors who qualify for membership in the band may substitute band work for the requirement in physical education; sophomores and freshmen may substitute band work for the requirements in physical education and in military science and tactics. Credit is not given during any semester for both band and either of the above-named subjects. Students desiring to play in the band as volunteers may do so, if qualified, and are entitled to the awards named in the following paragraph.

In addition to the above credits, one year of satisfactory service in the band entitles a student to a charm; two years of service, a sweater; three years, \$20.00 in cash; and four years, an additional \$20.00 in cash.

## PHILOSOPHY

ASSOCIATE PROFESSOR F. C. BECKER, Chairman

**Phil. 3. Introduction to Philosophy (3).**

A systematic approach to the problems which philosophic inquiry brings to the fore. Textbook and collateral readings; discussions. First and second semesters.

**Phil. 14. Logic and Scientific Method (3).**

An introduction to traditional logic with inquiry into the nature of discovery and proof. Second semester.

**For Advanced Undergraduates and Graduates**

**Phil. 101. Ancient Philosophy (3).**

From the beginnings of scientific and philosophical reflection in Ionia to the breakdown of the ancient world. A textbook is employed to systematize and give continuity to the subject matter, but several of the more important dialogues of Plato are studied, together with selections from Aristotle, and other collateral reading. First semester.

**Phil. 102. Modern Philosophy (3).**

The development of philosophical thought in the seventeenth, eighteenth, and nineteenth centuries with detailed study of some representative works in this period and collateral reading of others. Second semester.

**Phil. 107. Proseminar in Contemporary Philosophy (3).**

Philosophy since 1900 in the English speaking countries. Related movements in France, Germany, and Italy. Each student prepares during the year a paper on each of three contemporary philosophers representing diverse tendencies. Prerequisite: six hours in philosophy. First semester.

Mr. Becker

**Phil. 108. Proseminar in Contemporary Philosophy (3).**

Continuation of Phil. 107. Second semester. Mr. Becker

**Phil. 109. Esthetics: The Theory of Art and of Beauty (3).**

An attempt to reach a consistent, inclusive account of the nature of the esthetic and of its place in the life of man and in social organization. Lectures, reports, and discussions. First semester. Mr. Becker

**Phil. 112. Politics: The Theory of Human Relations (3).**

Social and political philosophy; a critical examination of the classical theories in this field, and of their assumptions with regard to human nature, justice, and liberty. Historical and constructive. Readings, class discussions, papers. Not given in 1943-44. Mr. Becker

**Phil. 115. Ethics: The Theory of Conduct (3).**

Ethics as a philosophical science. The origin and development of moral ideas. Analysis of the nature of the good, of duty and right, of moral judgment and moral ends. Second semester. Mr. Becker

**Phil. 116. The Theory of Nature (3).**

A survey of methods used in the study of nature. Not given in 1943-44.

**Phil. 117. Current Philosophical Problems (3).**

The philosophical implications of questions that are now to the fore in public debate. Reports, discussions, lectures and a term paper. First semester.

**Phil. 171. Readings in Philosophy (2 or 3).**

A course of readings in any of the various fields of philosophy, designed for the student who has a special interest in work not covered by the regularly rostered courses. Prerequisite: senior standing and the consent of the instructor. First semester. Mr. Becker

**Phil. 172. Readings in Philosophy (2 or 3).**

A continuation of Phil. 171. Second semester. Mr. Becker

**For Graduates**

Prerequisite to major graduate work in philosophy: four undergraduate courses in philosophy or equivalent preparation.

**Phil. 201. History of Philosophy from 600 B.C. to 529 A.D.  
(2 or 3).**

First semester. Mr. Becker

**Phil. 202. History of Philosophy from 529 A.D. to 1626 A.D.  
(2 or 3).**

Second semester. Mr. Becker

**Phil. 203. Ancient and Medieval Philosophers (2 or 3).**

A detailed study of the writings of one of the following philosophers:—Plato, Aristotle, Plotinus, Thomas Aquinas. The philosopher studied will be varied from year to year, and the course may be taken more than once for credit. It will be conducted as a seminar. First semester. Mr. Becker.

**Phil. 204. Modern Philosophers (2 or 3).**

A detailed study of selected writings of one or two outstanding modern philosophers such as Descartes, Spinoza, Locke, Berkeley, Hume, Hegel, and the course may be taken more than once for credit. It will be conducted as a seminar. Second semester.

Mr. Becker

**Phil. 208. Thesis in Philosophy (2 or 3).**

First semester.

Mr. Becker

**Phil. 209. Thesis in Philosophy (2 or 3).**

Second semester.

Mr. Becker

**PHYSICAL EDUCATION AND INTRAMURAL SPORTS**

ASSISTANT PROFESSOR BARTLETT, Director of Physical Education

The department of physical education and intramural sports has supervision and control of the required recreational physical activities of the student body. The aim of the department is to insure the health and physical development of every student of the University. Facilities for accomplishing this aim are afforded in Taylor Gymnasium, Grace Hall, the field house, the two playing levels of Taylor Field, and Lehigh Field.

Each student is given an annual physical examination by the director of the students' health service, assisted by the department of physical education. He is advised as to postural and physical defects.

All students are required to participate in some form of activity under departmental supervision. This requirement calls for three hours a week in the gymnasium or participation, under the supervision of the department, in an organized sport. In the gymnasium, opportunity is offered in the following activities: mass exercises, mass swimming, beginners' swimming, boxing, fencing, apparatus stunts, hand ball, life saving and golf. All undergraduate students must swim seventy-five feet before graduation. Students are encouraged to change their activities whenever it is thought best for their all-round development.

A comprehensive program in intramural sports is sponsored for the student body including fraternity, dormitory, interclass and

independent groups in touch football, tennis, soccer, badminton, handball, golf, individual athletics, basketball, swimming, wrestling, track, softball, and recreative games. Students are encouraged to participate in these sports and awards are given for excellence in performance.

Members of the R. O. T. C. Unit substitute one hour of military drill for one of the three hours of required physical education.

Individual exercises are prescribed for the correction of physical and functional defects. Students of this group are carefully examined and individually guided.

If a student is injured while engaged in any sport he must report as soon as possible to the director of the students' health service.

The department offers special courses of instruction for teaching physical education.

**P.E. 1. Physical Education.**

Freshman first semester.

**P.E. 2. Physical Education.**

Freshman second semester.

**P.E. 3. Physical Education.**

Sophomore first semester.

**P.E. 4. Physical Education.**

Sophomore second semester.

**P.E. 5. Physical Education.**

Junior first semester

**P.E. 6. Physical Education.**

Junior second semester.

**P.E. 7. Physical Education.**

Senior first semester.

**P.E. 8. Physical Education.**

Senior second semester.

**P.E. 23. The Organization and Administration of Physical Education (2).**

**THEORY.** The organization and supervision of physical education programs including the history of physical education systems, the administration of intramural activities, the qualifications of physical educators, the methods of teaching, and the planning of programs. First, second, and third semesters.

**P.E. 24. The Organization and Administration of Physical Education (1).**

**PRACTICE.** The practice of teaching mass physical activities including athletics, combative events, gymnastic games, apparatus stunts, and efficiency tests. Programs of corrective exercises for postural defects are considered. Three hours practice a week. First, second, and third semesters.

## PHYSICS

PROFESSOR BIDWELL  
ASSOCIATE PROFESSOR CHENEY

**Phys. 12. Introduction to Physics (3).**

A survey course for students in the Colleges of Arts and Science and of Business Administration. A brief introduction to the principal fields of physics. Lecture demonstrations, recitations, and laboratory. Fee, \$6.00. First semester.

**Phys. 16. General Physics (3).**

A continuation of Phys. 12. Lecture demonstrations and recitations. Prerequisite: Phys. 12, Math. 1, 1a, or 1b. Second semester.

**Phys. 17. General Physics Laboratory (2).**

A laboratory course in general physics to accompany Phys. 16. Prerequisites: Phys. 12, Math. 1, 1a, or 1b. Fee, \$10.00. Second semester.

**Phys. 22. Mechanics and Properties of Matter (4).**

Introduction to mechanics of solids and fluids; dynamics of point masses and rigid bodies; properties of matter. Two recitations, one lecture, and one laboratory period per week. Fee, \$6.00. First and second semesters.

**Phys. 23. Heat, Sound, and Light (4).**

Wave-motion and sound; heat, with emphasis on the mechanical theory; optics with emphasis on those portions of interest to technical students. Two recitations, one lecture, and one laboratory period per week. (The calculus is employed in this course). Prerequisite: *Math. 13, previously or concurrently*. Fee, \$6.00. First and second semester.

**Phys. 24. Electricity and Magnetism (4).**

Ohm's law, electric and magnetic fields, electromagnetism, induced electromotive forces, etc. Two recitations, one lecture and one laboratory period per week. (The calculus is employed in this course). Prerequisite: *Math. 13, previously or concurrently*. Fee, \$6.00. First and second semesters.

**Phys. 50. Industrial Employment.**

Eight weeks industrial employment during the summer, following the junior year with submission of a written report.

**For Advanced Undergraduates and Graduates****Phys. 110. Electrical Laboratory (1).**

Precise measurements. Prerequisite: *Phys. 24*. Fee \$6.00. First semester.

**Phys. 111. Electrical Laboratory (1).**

Precise measurements. Continuation of *Phys. 110*. Prerequisites: *Phys. 24; Phys. 110*. Fee, \$6.00. Second Semester.

**Phys. 120. Electric Oscillations and Electric Waves (3).**

Electric oscillations and waves and high frequency phenomena. One laboratory and two class periods a week. Prerequisites: *Math. 13, Phys. 23 and 24, or 16; Phys. 110, 162*. Fee, \$6.00. Second semester.

**Phys. 122. Physical Optics and Spectroscopy (3).**

The wave theory of light, interference, diffraction, polarization, etc.; exposition of some phases of spectroscopic phenomena. One laboratory and two class periods a week. Prerequisite: *Math. 13; Phys. 23 and 24, or 16; Phys. 110, 162*. Fee, \$6.00. First semester.

**Phys. 124. Electrical Discharge through Gases (3).**

Properties of gaseous ions, the experimental data leading to the electron theory, including a study of vacuum tube phenomena, ionization and resonance potentials, photo-electricity, etc. One laboratory, and two class periods a week. Prerequisite: *Math. 13, Phys. 23 and 24, or 16; Phys. 110, 162*. Fee, \$6.00. First semester.

**Phys. 126. Pyrometry (3).**

High and low temperature measurements. Practical exercises in the use of the thermocouple, the resistance thermometer, the radiation and optical pyrometer, and similar instruments. One laboratory and two class periods a week. Prerequisites: *Math. 13, Phys. 23 and 24, or 16*. Fee, \$6.00. Second semester.



**Phys. 140. Teaching of Physics in Secondary Schools (3).**

The aims, methods, and content of a secondary school course in physics. Various physics syllabi are used as an outline. Review of a standard text with simple demonstrations. Examination of standard laboratory manuals and performance of selected experiments. Discussion of modern physical theories. Open only to teachers or prospective teachers of high school physics. Four conferences and two laboratory periods per week. Summer session.

**Phys. 150. Geophysics (3).**

The application of physical measurements to the study of geologic structures. The seismic method. For advanced students in geology, mining, and physics. One laboratory period and two lectures each week. Prerequisites: *Phys. 23 and 24, or 16, Math. 13; Geol. 10; Geol. 1.* Fee, \$6.00. First semester.

**Phys. 151. Geophysics (3).**

Continuation of Phys. 150. Theory and field work in gravitational, magnetic, and electric methods with emphasis on the use of the torsion balance, the dip needle, and the method of equipotentials. Fee, \$6.00. Second semester.

**Phys. 160. Introduction to Modern Physical Theories (3).**

Recent developments, including Maxwell's field equations, photoelectricity, radiation, the quantum theory, X-rays, relativity, and the structure of the atom. Prerequisites: *Math. 13, Phys. 23 and 24, or 16.* First semester.

Mr. Bidwell

**Phys. 161. Introduction to Modern Physical Theories (3).**

Continuation of Phys. 160. Prerequisites: *Math. 13, Phys. 23 and 24, or 16; Phys. 160.* Second semester.

Mr. Bidwell

**Phys. 162. Introductory Theory of Electricity and Magnetism (3).**

Magnetic fields and potentials; electrostatic fields, potentials and capacities; the Maxwell-Thomson theory of lines of force; electromagnetic fields; variable and alternating current. Prerequisites: *Math. 13, Phys. 24 or 16.* First semester.

**Phys. 163. Introductory Theory of Electricity and Magnetism (3).**

Continuation of Phys. 162. Prerequisites: *Math. 13, Phys. 24 or 16; Phys. 162.* Second semester.

**Phys. 164. Advanced Laboratory (1 or 2).**

Laboratory work of research type. Special problems assigned and the student placed largely on his own initiative. Prerequisite: senior standing in engineering physics. Fee, \$6.00. First semester.

**Phys. 165. Advanced Laboratory (1 or 2).**

Continuation of Phys. 164. Prerequisite: senior standing in engineering physics. Fee, \$6.00. Second semester.

**Phys. 170. Spectroscopy (2 or 3).**

The interpretation of the findings of modern spectroscopy. A choice will be made from the various divisions of spectrum analysis such as excitation of spectra by impacts, hyper-fine structure, spectra of isotopes, band spectra and molecular constants, Raman spectra, spectrographic means of analysis. The method of obtaining data will be illustrated in laboratory problems. Two class periods per week and one optional laboratory period per week. Students desiring the laboratory work will register for three credits. Second semester.

**For Graduates**

The election of purely graduate courses in physics should ordinarily be preceded by such study of the particular field as that presented in courses in the 100 group. A thorough knowledge of the differential and integral calculus is presupposed and further accompanying study of mathematics is generally advisable.

Math. 219 and 220, Selected Topics in Quantum Mechanics and Relativity, E.E. 209, 210, Radio Communication, and E.E. 215, 216, Vacuum Tubes and Their Application, may be included in a graduate major in physics.

**Phys. 201. Kinetic Theory (3).**

The classical considerations of the kinetic theory of gases substantially as in Boltzmann with additional applications to electrical phenomena. First semester.

**Phys. 202. Thermodynamics (3).**

A course devoted principally to classical thermodynamics following Planck. Second semester.

**Phys. 207. Theory of Light (3).**

The propagation of light, interference, diffraction; the measurement of wave-length, crystal optics; introduction of quantum theories of the interpretation of spectra. This course follows Shuster and Nicholson's *Theory of Optics*. First semester.

**Phys. 208. Theory of Light (3).**

Continuation of Phys. 207. Second semester.

**Phys. 214. Quantum Mechanics (3).**

Brief historical description of present theory. Applications to simple problems. Perturbation methods. Calculation of energy levels and spectral intensities. Quantum theory of collision processes and of radiation. Nuclear quantum mechanics. First or second semester.

**Phys. 216. Theory of X-rays (3).**

The theory of the production and properties of X-rays; reflection, scattering, and dispersion of X-rays, crystal structure determination; X-ray spectra; ejection of electrons. First or second semester.

**Phys. 220. Theoretical Physics (3).**

The methods of mathematical and theoretical physics. The subject matter covered in this course and in Phys. 221, 222, and 223 is that generally considered necessary for more detailed work in special fields. Required of all candidates for the doctorate. First semester.

**Phys. 221. Theoretical Physics (3).**

Continuation of Phys. 220. Prerequisite: Phys. 220. Second semester.

**Phys. 222. Advanced Theoretical Physics (3).**

A continuation of Phys. 220 and 221. Required of all candidates for the doctorate. Prerequisite: Phys. 221 or equivalent. First semester.

**Phys. 223. Advanced Theoretical Physics (3).**

Continuation of Phys. 222. Prerequisite: Phys. 222. Second semester.

**Phys. 226. Nuclear Physics (3).**

Radioactive transformations; properties of alpha, beta, and gamma rays; neutrons, positrons, cosmic rays; nuclear transformations and methods of producing them. First or second semester.

**Phys. 228. Physics of the Earth (3).**

The figure of the earth; its physical constitution and thermal condition; the causes of mountain building and the nature of isostasy. The course is based on "The Earth" by H. Jeffreys. First semester.

**Phys. 260. Seminar in Modern Physics (3).**

An extension of Phys. 160 in special fields such as nuclear physics, the metallic state, etc. First semester. Mr. Bidwell

**Phys. 261. Seminar in Modern Physics (3).**

Continuation of Phys. 260. Second semester.

Mr. Bidwell

**PORTUGUESE**  
See Romance Languages

## PSYCHOLOGY

ASSOCIATE PROFESSOR GRAHAM  
ASSISTANT PROFESSOR F. C. BECKER  
DR. HOFFMAN, M.D.

### **Psych. 1. Elementary Psychology (3).**

The principles of human behavior and the methods of investigation. A foundation course for all students taking further psychology. Each semester.

### **Psych. 15. Industrial Psychology (3).**

The principles of human behavior in the industrial environment. Two lectures and two hours of laboratory each week. Prerequisite: Psych. 1. Second semester.

### **Psych. 16. Psychology in Business (3).**

Psychological problems involved in advertising and selling, sales personnel, and psychology from the standpoint of the consumer. Prerequisite: Psych. 1. Second semester.

### **Psych. 51. Readings in Psychology (2 or 3).**

Readings on organized topics selected after consultation with staff members. Prerequisite: Psych. 1. Each semester.

## For Advanced Undergraduates and Graduates

### **Psych. 101. Psychology of Industrial Personnel (3).**

Review of the literature on industrial personnel research. Prerequisites: Psych. 1 and 15, or graduate standing. First semester. Mr. Graham

### **Psych. 102. Aptitude Testing (3).**

The predictive measurements of individual differences, concepts, techniques, and materials necessary to understand the selection and guidance problems. Prerequisite: Psych. 1. Second semester. Mr. Graham

### **Psych. 104. Social Psychology (3).**

A psychological interpretation of social phenomena. Prerequisite: Psych. 1. First semester. Mr. Graham

### **Psych. 108. Genetic Psychology (3).**

The genesis, growth, and development of psychological processes and the bearing of the chief developmental changes upon behavior tendencies. Prerequisite: Psych. 1. Second semester. Mr. Graham

### **Psych. 109. Abnormal Psychology (3).**

Gross maladjustive patterns and deviations in individual and societal behavior. Lectures, discussions, and clinical observations in the psychopathic hospital. Prerequisite: Psych. 1. Second semester. Mr. Graham

**Psych. 110. Learning and Motivation (3).**

A systematic approach to these basic psychological processes and problems. Prerequisite: Psych. 1. First semester. Mr. Becker

**Psych. 111. Minor Research (2 or 3).**

Assigned problems for investigation. Prerequisites: Psych. 1 and consent of the head of the department. Each semester. Mr. Graham

**Psych. 112. Minor Research (2 or 3).**

Either a continuation of Psych. 111 or a different problem for investigation. Prerequisites: Psych. 1 and consent of the head of the department. Each semester. Mr. Graham

**Psych. 117. Personality (3).**

A psychological interpretation of personality, its development, determinants, analysis, and relationship to successful adjustment. Prerequisites: Psych. 1. First semester. Mr. Graham

**Psych. 120. History of Psychology (3).**

A historical approach to psychological facts, theories, fields, and methods. First semester. Mr. Becker

**Psych. 131. Neurological Aspects of Behavior (1).**

Laboratory work and discussions concerning such phases of the structure and function of the nervous system as are of particular interest in the study of psychology. Prerequisite: Psych. 1. Not given in 1943-44. First semester. Mr. Graham

**Psych. 132. Sensory Psychology (2).**

Laboratory work and discussions covering the various sensory processes from both theoretical and experimental viewpoints. One hour discussion and two hours of laboratory work each week. Prerequisite: Psych. 1. Not given in 1943-44. Second semester. Mr. Graham

**Psych. 133. Complex Psychological Processes (3).**

Laboratory work involving apparatus techniques for the study of selected phases of attention, perception, learning, and emotion. Six hours of laboratory work per week. Prerequisite: Psych. 1. Second semester. Mr. Graham

**For Graduates**

During the war emergency, graduate classes will be adjusted to meet student demand and availability of staff.

**Psych. 203. Seminar in General Psychology (3).**

Some significant aspect in psychological theory or principle, but varied from year to year in accordance with students' needs. Mr. Graham

ROMANCE LANGUAGES

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**Psych. 204. Seminar in General Psychology (3).**

Either a continuation of Psych. 203 or a new topic. Mr. Graham

**Psych. 205. Seminar in Applied Psychology (3).**

Some significant applications in psychology, but the topic will vary from year to year in accordance with students' needs. Mr. Graham

**Psych. 206. Seminar in Applied Psychology (3).**

Either a continuation of Psych. 205 or a new topic. Mr. Graham

**Psych. 209. Systematic Psychology (3).**

A critical approach to the methods, evidence, and theories of psychology; the building of an organization of basic principles.

Messrs. Graham, Becker

**Psych. 210. Systematic Psychology (3).**

A continuation of Psych. 209. Prerequisite: Psych. 209.

Messrs. Graham, Becker

**Psych. 211. Major Research (3).**

Assigned problems for investigation on a graduate level. Mr. Graham

**Psych. 212. Major Research (3).**

Either a continuation of Psych. 211 or a new problem. Mr. Graham

**PUBLIC SPEAKING**

See English, Speech

ROMANCE LANGUAGES

PROFESSOR BARTHOLD

**FRENCH**

**Fr. 1. Elementary French (3).**

First semester.

**Fr. 2. Elementary French (3).**

Continuation of Fr. 1. Prerequisite: Fr. 1. Second semester.

**Fr. 11. Intermediate French (3).**

Reading based on works of 19th and 20th century writers. Formal review of French grammar with prose composition. Outside reading. Prerequisite: one year of college French or entrance French A. First semester.

**Fr. 12. Intermediate French (3).**

Continuation of Fr. 11. Prerequisite: Fr. 11. Second semester.

**Fr. 13. Types of French Literature (3).**

Training in the ability to read and understand representative works from the seventeenth century to the present day. Accurate translation of texts of graded difficulty. Rapid reading and discussion of other works. Prerequisites: Fr. 11 and 12, or three years of preparatory school French. First semester.

**Fr. 14. Types of French Literature (3).**

Continuation of Fr. 13. Prerequisite: Fr. 13. Second semester.

**Fr. 21. Seventeenth Century French Literature (3).**

The age of classicism. Lectures, study of texts, collateral readings, and reports. Prerequisites: Fr. 13 and 14. First semester.

**Fr. 22. Eighteenth Century French Literature (3).**

Follows Fr. 21. The rise of liberalism as reflected in the writings of Montesquieu, Diderot, Rousseau, and Voltaire. Prerequisites: Fr. 13 and 14. Second semester.

**Fr. 31. Nineteenth Century French Literature (3).**

Main literary currents of the nineteenth century: romanticism and realism. Lectures, reports, collateral readings. Prerequisites: Fr. 13 and 14. First semester.

**Fr. 32. Nineteenth Century French Literature (3).**

Continuation of Fr. 31. Prerequisite: Fr. 31.

**Fr. 41. French Oral and Written Composition (3).**

For students who wish a greater opportunity for practice in the oral and written use of modern French. Prerequisites: Fr. 13 and 14. First semester.

**Fr. 42. French Oral and Written Composition (3).**

Continuation of Fr. 41. Prerequisite: Fr. 41. Second semester.

**For Advanced Undergraduates and Graduates**

**Fr. 101. French Literature before the Seventeenth Century (3).**

A general review of French literature from its beginning through the 16th century. Prerequisites: Fr. 31 and 32, or the equivalent. First semester.

**Fr. 102. Contemporary French Literature (3).**

Prerequisites: Fr. 31 and 32, or the equivalent. Second semester.

**Fr. 103. Proseminar (3).**

A study of the works of some author or group of authors or of a period. Prerequisites: Fr. 31 and 32, or the equivalent. First semester.

**Fr. 104. Proseminar (3).**

Continuation of Fr. 103. Second semester.

**For Graduates**

Prerequisite: graduate students who major in French must have completed not less than twelve semester hours of French language and literature above the standard intermediate courses. A reading knowledge of Latin and German is desirable; a general knowledge of English literature is required; a thorough acquaintance with Latin grammatical forms is essential for Fr. 201 and 202.

**Fr. 201. Old French (3).**

First semester.

**Fr. 202. Old French (3).**

Continuation of Fr. 201. Second semester.

**Fr. 203. French Literature of the Renaissance (3).**

First semester.

**Fr. 204. French Literature of the Renaissance (3).**

Continuation of Fr. 203. Second semester.

**Fr. 211. The History of the Novel in France (3).**

Reading of representative works of different periods and analysis of the growth of the novel as a literary form. First semester.

**Fr. 212. The History of the Novel in France (3).**

Continuation of Fr. 211. Second semester.

**Fr. 213. Modern French Poetry (3).**

A history of French poetry from the Parnassian school to the present day. First semester.

**Fr. 214. Contemporary French Theater (3).**

A history of the contemporary French theater from the *Théâtre libre* to the present day. Second semester.

**ITALIAN**

**Ital. 1. Elementary Italian (3).**

Grammar and composition, rapid reading of easy modern prose. First semester.

**Ital. 2. Elementary Italian (3).**

Continuation of Ital. 1. Prerequisite: Ital. 1. Second semester.

**Ital. 11. Intermediate Italian (3).**

The age of Dante. Lectures and readings in the *Divina Commedia*. Given in English. Prerequisites: Ital. 1 and 2. First semester.

**Ital. 12. Intermediate Italian (3).**

Continuation of Ital. 11. Second semester.

**PORtUGUESE**

**Port. 1. Elementary Portuguese (3).**

A study of Portuguese grammar and forms. Practice in writing and speaking Portuguese. Prerequisite: consent of the instructor. First semester.

**Port. 2. Elementary Portuguese (3).**

Continuation of Portuguese 1. Second semester.

**SPANISH**

**Span. 1. Elementary Spanish (3).**

First and second semesters.

**Span. 2. Elementary Spanish (3).**

Continuation of Span. 1. Prerequisite: Span. 1. First and second semesters.

**Span. 11. Intermediate Spanish (3).**

Reading of modern Spanish prose, with a view of acquiring exactness and speed in reading. Rapid review of grammar with prose composition. Prerequisite: *one year of college Spanish or entrance Spanish A*. First semester.

**Span. 12. Intermediate Spanish (3).**

Continuation of Span. 11. Prerequisite: Span. 11. Second semester.

**Span. 21. Spanish Novels and Plays (3).**

Reading and discussion of selected texts. Outside reading and reports. Prerequisites: Span. 11 and 12. First semester.

**Span. 22. Spanish Novels and Plays (3).**

Continuation of Span. 21. Prerequisite: Span. 21. Second semester.

**Span. 31. Spanish Oral and Written Composition (3).**

For students who wish a greater opportunity for practice in the oral and written use of modern Spanish. Prerequisite: *consent of the head of the department*. First semester.

**Span. 32. Spanish Oral and Written Composition (3).**

Continuation of Span. 31. Second semester.

**For Advanced Undergraduates and Graduates**

**Span. 101. Spanish Fiction of the Sixteenth and Seventeenth Centuries (3).**

The novel of the Golden Age with special attention to Cervantes' *Don Quixote*. Collateral reading and reports. Prerequisites: Span. 21 and 22. First semester.

**Span. 102. Spanish Drama of the Sixteenth and Seventeenth Centuries (3).**

Selected plays by Lope de Vega, Tirso de Molina, and Calderón. Collateral reading and reports. Prerequisites: Span. 21 and 22. Second semester.

**Span. 103. Proseminar (3).**

A study of the works of some author or group of authors or of a period. Prerequisites: Span. 21 and 22. First semester.

**Span. 104. Proseminar (3).**

Continuation of Span. 103. Second semester.

**Span. 111. Spanish-American Literature (3).**

Brief survey of the whole field of Spanish-American literature, with emphasis on works of modern writers. Prerequisites: Span. 21 and 22. First semester.

**Span. 112. Spanish-American Literature (3).**

Continuation of Span. 111. Second semester.

**For Graduates**

Prerequisite: Graduate students who major in Spanish must have completed not less than twelve semester hours of Spanish language and literature above the standard intermediate courses. A reading knowledge of Latin and French is desirable.

**Span. 201. Old Spanish (3).**

First semester.

**Span. 202. Old Spanish (3).**

Continuation of Span. 201. Second semester.

**Span. 211. The Modern Spanish Novel (3).**

Reading, reports, and lectures. First semester.

**Span. 212. The Modern Spanish Novel (3).**

Continuation of Span. 211. Second semester.

**SOCIOLOGY**

**See Economics and Sociology**

**SPANISH**

**See Romance Languages**

**SPEECH**

**See English**

**STATISTICS**

**See Accounting**

## DIVISION OF INTERCOLLEGIATE ATHLETICS

ACTING DIRECTOR CARAWAY

MESSRS. SHERIDAN, MERCUR, AND PRENDERGAST

The division of intercollegiate athletics offers opportunity to the undergraduate student body to participate in intercollegiate competition both at home and abroad with institutions which are Lehigh's natural rivals and also other institutions which are at some distance.

The intercollegiate program consists of varsity teams in football, soccer, wrestling, basketball, swimming, tennis, track, and baseball, as well as junior varsity teams in football, wrestling, basketball, swimming, and baseball.

**Army Specialized Training  
Program**

**and**

**Army Specialized Training  
Reserve Program**



## **ASTP AND ASTRP**

### **Staff**

Staff members, in addition to regular members of the faculty, appointed for varying periods of service, who participated in the work of the Army Specialized Training Program and the Army Specialized Training Reserve Program.

Robert Charles King, M.A.,.....	<i>Mathematics</i>
John B. Noggle, 2nd Lt., A.U.S.,.....	<i>Military Training</i>
Robert Erwin Scheetz, M.Ed., .....	<i>Mathematics</i>
Richey B. Sumner, Capt., U.S.A., Res.,.....	<i>Military Training</i>

### **Administrative Officers**

<i>Coordinator</i> .....	A. C. Callen
<i>Director of Housing and Commissary</i> .....	E. K. Smiley

## ASTP AND ASTRP

The 3309th Service Unit of the Army Specialized Training Division of the Army Service Forces, War Department, was established at Lehigh University in June 1943. Instruction in the Basic Engineering curricula, Advanced Engineering curricula, and Foreign Area and Language curricula began on July 12, 1943, and in the Air Corps Enlisted Reserve curricula on August 7, 1944.

The regular unit of the Reserve Officers Training Corps, consisting of regular civilian students and students enlisted in the Enlisted Reserve Corps (ERC), became known as the 3351st Service Unit of the ASTP, but continued to function fundamentally as it had previously functioned.

The curricula and courses offered under the 3309th Service Unit organization from April 1944 to January 27, 1945 are set forth below. Curricula and courses offered prior to April 1944 are set forth in the March 1944 University Register. Full information is given both to provide a record of the University's participation in the war effort and to provide adequate information for the evaluation of academic credit for work completed by trainees. Instruction was provided for the most part by the regular members of the University faculty, with some crossing of departmental lines, but was supplemented by additional staff appointments as set forth above.

### Basic Engineering Curricula

#### BE. 1. Term 2.

Taught April 10, 1944 to June 30, 1944.

		Class Hours	Laboratory Hours
AST. 206.	Chemical Principles and Important Elements .....	2	4
AST. 111b.	English .....	2	-
AST. 163b.	Geography .....	2	-
AST. 133b.	History .....	2	-
AST. 407.	Analytic Geometry .....	5	-
AST. 305.	Heat, Sound, and Light.....	4	3
Second Term Basic Military Course.....		2	2
Physical Training .....		-	6

ARMY SPECIALIZED TRAINING PROGRAM

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**Air Corps Enlisted Reserve Curriculum**

**N-10. Term 1.**

Taught August 7, 1944 to October 28, 1944.

		Class Hours	Laboratory Hours
AST. 11.	Reading and Writing .....	4	—
AST. 11.	Physical and Economic Geography .....	4	—
AST. 11.	Review of Arithmetic, Algebra and Plane Geometry .....	6	—
AST. 11.	Force, Motion, and Machines .....	3	4
First Term Basic Military Course .....		2	2
Physical Training .....		—	6

**N-30. Term 2.**

Taught November 6, 1944 to January 27, 1945.

		Class Hours	Laboratory Hours
AST. 12.	Reading and Writing .....	4	—
AST. 31.	United States in World Affairs .....	5	—
AST. 12.	Algebra and Trigonometry .....	6	—
AST. 12.	Basic Electricity .....	4	3
Second Term Basic Military Course .....		2	2
Physical Training .....		—	6

**N-10 (Special). Term 1.**

Taught August 7, 1944 to October 28, 1944.

		Class Hours	Laboratory Hours
AST. 61.	Chemical Principles and Methods .....	3	2
AST. 61.	Reading and Writing .....	3	—
AST. 61.	United States in World Affairs since 1918 .....	4	—
AST. 11.	Review of Arithmetic, Algebra and Plane Geometry .....	6	—
AST. 11.	Force, Motion, and Machines .....	3	4
First Term Basic Military Course .....		2	2
Physical Training .....		—	6

**N-30 (Special). Term 2.**

Taught November 6, 1944 to January 27, 1945.

		Class Hours	Laboratory Hours
AST. 62.	Chemical Principles and Applications .....	3	3
AST. 62.	Reading and Writing .....	3	—
AST. 71.	Geography .....	5	—
AST. 12.	Algebra and Trigonometry .....	6	—
AST. 12.	Basic Electricity .....	4	3
Second Term Basic Military Course .....		2	2
Physical Training .....		—	6

LEHIGH UNIVERSITY

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**B-60. Term 1.**

Taught August 7, 1944 to October 28, 1944.

		Class Hours	Laboratory Hours
AST. 61.	Chemical Principles and Methods..	3	2
AST. 61.	Reading and Writing .....	3	—
AST. 61.	United States in World Affairs since 1918 .....	4	—
AST. 61.	Algebra and Trigonometry .....	6	—
AST. 61.	Mechanics .....	4	3
First Term Basic Military Course .....		2	2
Physical Training .....		—	5

**B-60. Term 2.**

Taught November 6, 1944 to January 27, 1945.

		Class Hours	Laboratory Hours
AST. 62.	Chemical Principles and Applica- tions .....	3	3
AST. 62.	Reading and Writing .....	3	—
AST. 71.	Geography .....	5	—
AST. 62.	Analytic Geometry and Introduct- ion to Calculus .....	5	—
AST. 62.	Electricity and Magnetism .....	4	3
Second Term Basic Military Course .....		2	2
Physical Training .....		—	6

## DESCRIPTION OF COURSES

Following is a description of the courses taught at Lehigh University under the Army Specialized Training Program and Army Specialized Training Reserve Program. Course numbers are those supplied by the Army Specialized Training Division of the Army Service Forces, with certain local modifications. In the case of courses bearing the same Army number for each of two or more terms, the letters "a", "b", and "c" have been added for clarity in designating the respective terms of work. Contact hours are recorded without implication as to term hours or semester hours of credit. Each course was 12 weeks in length.

### Basic Engineering

#### CHEMICAL ENGINEERING AND CHEMISTRY

**AST. 61. Chemical Principles and Methods.**

Atomic theory, atomic structure; periodic classification of the elements. Kinetic theory, states of matter, solutions. The laws of chemical change; quantitative relationships; types of chemical reactions. Detailed study of oxygen, hydrogen, the halogens, sulfur and the important compounds of these elements. Holmes, "General Chemistry". (3 class hours, 2 laboratory hours.)

## E N G L I S H

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**AST. 62. Chemical Principles and Applications.**

Ionic reactions and chemical equilibrium. Nitrogen and its compounds. Carbon and silicon; types and applications of organic compounds. Metals and alloys; metallurgical processes; the alkali and alkaline earth metals and their compounds; the copper group of metals. Holmes, "General Chemistry". Billinger and Smith, "General Chemistry Experiments". (3 class hours, 3 laboratory hours.)

**AST. 206. Chemical Principles and Important Elements.**

Ionic reactions and chemical equilibrium. Nitrogen and its compounds. Carbon and silicon; types and applications of organic compounds. Metals and alloys; metallurgical processes; the alkali and alkaline earth metals and their compounds; the copper group of metals. Holmes, "General Chemistry". Billinger and Smith, "General Chemistry Experiments". (2 class hours, 4 laboratory hours.)

## Air Corps Enlisted Reserve Curriculum

### ENGLISH

**AST. 11. Reading and Writing.**

An intensive review of English composition and grammar at the high school level, with assignments at the end of the term at the freshman college level in English composition. Eight expository themes correlated with assignments in the textbooks. Six class hours spent in study of the construction of simple military letters and indorsements and of AR 340-15 covering military correspondence.

Assignments: Jones, Easley S., "Practical English Composition", 3rd ed., sections C, D, E, 1, 10, 12, 13, 14, 15, 17, 18, 20, 22, 23, 25; Wright and Swedenberg, "The American Tradition", selections beginning on pp. 44, 81, 120, 129, 199, 418, 507, 522, 544. Five study hours per week. (4 class hours.)

**AST. 12. Reading and Writing.**

An English course at the freshman college level. Six themes correlated with assignments in the textbooks.

Assignments: Jones, Easley S., "Practical English Composition", 3rd ed., sections 1, 2, 3, 5, 20, 21, 35, 36, 43, 44, 45, 46, 47, 48; Wright and Swedenberg, "The American Tradition", selections beginning on pp. 42, 67, 81, 160, 199, 227, 245, 264, 367, 522. Five study hours per week. (4 class hours.)

**AST. 61. Reading and Writing.**

An intensive review of English composition and grammar at the high school level, with assignments at the end of the term at the college level in freshman English. Eight expository themes correlated with assignments in the textbooks. Six class hours were spent in study of the construction of simple military letters and indorsements and of AR 340-15 covering military correspondence.

Assignments: Jones, Easley S., "Practical English Composition", 3rd ed., sections C, D, E, 1, 10, 12, 13, 14, 15, 17, 18, 20, 22, 23, 25; Wright and Swedenberg, "The American Traditions", selections beginning on pp. 44, 81, 120, 129, 199, 418, 507, 522, 544. Three study hours per week. (3 class hours.)

**AST. 62. Reading and Writing.**

An English course at the freshman college level. Six themes correlated with assignments in the textbooks.

Assignments: Jones, Easley S., "Practical English Composition", 3rd ed., sections 1, 2, 3, 5, 20, 21, 35, 36, 43, 44, 45, 46, 47, 48; Wright and Swedenberg, "The American Tradition", selections beginning on pp. 42, 67, 81, 160, 199, 227, 245, 264, 367, 522. Three study hours per week. (3 class hours.)

**AST. 111b. English. (January to April 1944.)**

Assignments: Jones, Easley S., "Practical English Composition", 3rd ed. Review of sections 10, 15, 17, 18, 22, 23, 37. Study of sections 13, 12, 14, 38, 39, 43, 44, 45, 46, 47. Wheat, "The Democratic Tradition in America". Selections beginning on pp. 152, 196, 253, 324. Brembeck and Rights, "Speech for the Military". Projects 5, 7. Six expository themes, correlated with assignments in Jones and Wheat. (2 class hours.)

## GEOGRAPHY

**AST. 11. Physical and Economic Geography.**

Chronology; weather; rock weathering; soils; land forms; population distribution; climate, climatic types; ice and wind; rivers; the physiographic cycle; surface waters, underground water; the oceans, marine environment; rocks, minerals and mineral products, strategic minerals; cartography; topographic maps. Davis, "Earth and Man", chapters 1-20, 34-36; Appleton's "Modern School Atlas", pp. 1-9, 14-17, 20-33, 72, 73, 91-94; The United States Geological Survey, Allentown topographic map.

Hunting and fishing; grazing, nomadic and commercial; dairying; oriental agriculture; plantation agriculture; occidental agriculture, corn, wheat, fruits, etc.; the mineral industries; the mineral fuels; water-power development; the manufacturing industries; transportation and world trade. Klim, Starkey, and Hall, "Introductory Economic Geography", Chapters 15-37; Appleton's "Modern School Atlas". (4 class hours.)

**AST. 71. Geography.**

Physical Geography: the earth and space; solar system; planetary and terrestrial movements; seasons; cartography; map history and map making; major earth features; latitude and longitude; chronology; latitude, longitude, and time problems; topographic maps; grids and conventions; projections; photogrammetry; rocks and minerals; rock weathering; soils; glaciers and wind; running water; the physiographic cycle; underground water, lakes, swamps, mountains, plains, plateaus; oceans; shore lines; meteorology; population; climatology; mineral resources; strategic miner-

als. Finch and Trewartha, "Physical Elements of Geography", Chapters 1-21, 24-27, Appendices B and C; ASTP Atlas. The first eight weeks of the term were devoted to this work.

Regional Geography: hunting and fishing; major agricultural systems, tropical, oriental, occidental; characteristics of continents; transportation systems and development; the flow of world trade, character and major routes. Jones and Darkenwald, "Economic Geography", ASTP Atlas. The last four weeks of the term were devoted to this work. (5 class hours.)

## HISTORY

### **AST. 31. United States in World Affairs.**

Spanish-American War, Treaty of Paris, China and the Open Door, international politics, Panama Canal, dollar diplomacy, World War I, Treaty of Versailles. Washington Disarmament Conference, international debt settlements, Coolidge prosperity, Twentieth Century reforms. Depression of 1929-1940, emergency measures, extension of national control, and the Supreme Court. Good Neighbor policy, World War II, Pearl Harbor attack, international conferences, and the progress of the war. (5 class hours.)

### **AST. 61. United States in World Affairs since 1918.**

United States in World War I, Versailles Treaty: League of Nations, World Court, election of 1920. Washington Disarmament Conference, international debt agreements, Locarno Pact, Kellogg-Briand agreement, and the London Disarmament Conference. Manchurian incident, the Hoover-Stimson Doctrine, world financial crisis, and the debt moratorium. Mussolini and Hitler aggressions, Roosevelt's Chicago speech, Munich agreement, World War II. Hitler's early victories, Lend-lease, Atlantic Charter, Pearl Harbor attack, prosecution of the war, and international conferences. (4 class hours.)

### **AST. 133b. World History Since 1919.**

Analysis of recent developments in history and international relations, since 1919, with emphasis upon the roles of the Great Powers in world politics; peace settlements following the War of 1914-1918; the search for security through disarmament, the League of Nations, the World Court, European Union; economic nationalism; new ideologies; and the road to another war. Rousek, "Contemporary Europe", selected chapters. (2 class hours.)

## MATHEMATICS

### **AST. 11. Review of Arithmetic, Algebra, and Plane Geometry.**

W. W. Hart, "Basic Mathematics" (Brief Edition). The subjects of arithmetic, algebra, geometry, and elementary trigonometry, as treated in the text, were covered with supplementary work on factoring, operations with fractions, theorems on angles, length of circular arc, and similar triangles. (6 class hours.)

**AST. 12. Algebra and Trigonometry.**

Petersen, "Intermediate Algebra"; Rickey and Cole, "Trigonometry". The text in algebra from page 149 to page 322 was covered; the topics: exponents and radicals, logarithms, linear equations in two unknowns, quadratic equations, binomial theorem, variation, arithmetic and geometric progressions. Trigonometry as far as functions of sum and difference of angles. (5 class hours.)

**AST. 61. Algebra and Trigonometry.**

Petersen, "Intermediate Algebra"; Rickey and Cole, "Trigonometry". Material covered in algebra, Articles 21 to 128 except 25 to 31 and 99-101. The usual course in algebra through the binomial theorem. Covered in trigonometry all to Chapter X. The usual course in plane trigonometry. (6 class hours.)

**AST. 62. Analytic Geometry and Introduction to Calculus.**

Young, Fort and Morgan, "Analytic Geometry". All material in the text covered except eccentricity definition of conic, tangents, rotation of axes, other loci and the chapters on solid analytic geometry. The usual course in plane analytic geometry including polar coordinates plus two chapters on an introduction to calculus. (5 class hours.)

**AST. 407. Analytic Geometry.**

Young, Fort, and Morgan, "Analytic Geometry". All material in this book was covered except the portion on "Introduction to Calculus", with certain supplementary additions—notably a more complete discussion of transcendental functions. (5 class hours.)

**MILITARY TRAINING**

**First Term Basic Military Course.**

The articles of war, especially the so-called punitive articles of war, with the particular object of obtaining the cooperation of the individual in living up to established regulations and rules; the fundamental organization of the Army and its different components; military courtesy and essential customs in military service; military sanitation and sex hygiene; the use of the first-aid packet and proper procedure in rendering first-aid treatment to wounded men; interior guard duty, and the dignity and responsibility of a guard as a protection of a command as a whole; care of clothing and equipment; making and wearing the pack; pitching shelter tents; safeguarding military information; principles of foot marching, march discipline, march hygiene, and march sanitation; training and defense against chemical, air, and mechanized attack; care and manifestation of the rifle and correct principles of marksmanship; infantry drill. (2 class hours, 1 rifle hour, 1 drill hour, 1 study hour.)

**Second Term Basic Military Course.**

Defense against enemy mechanized vehicles; recognition of U. S. mechanized vehicles; providing initial hasty shelter under fire; night operations under combat conditions; rifle instruction; tactics of small units; infantry drill. (2 class hours, 1 rifle hour, 1 drill hour, 1 study hour).

**PHYSICAL TRAINING**

The Department of Physical Education conducted a varied and intensive program for trainees. The schedule called for six hours of training per week, which consisted of three periods of two hours each. The department followed a sound program of a great variety of strenuous calisthenics, guerrilla exercises, grass drills, relays, and various types of running, as set up by the Army. Included in the general conditioning program were aquatics (non-swimmers', functional swimming, and Red Cross life-saving courses), wrestling, boxing, fencing, personal defense, gymnastics, and team sports (which consisted of touch football, softball, soccer, volleyball, and basketball.) In addition, intra-mural basketball and other sports were encouraged, and a basketball team represented the unit in playing other colleges. Tests were given at the beginning and end of each twelve week period to indicate relative progress. The program gave the participants in the shortest possible time an all around training which helped to fit them for their military duties.

**PHYSICS****AST. 11. Force, Motion, and Machines.**

Mechanics of point masses; units; forces in equilibrium, composition and resolution of force; laws of motion, projectiles; work and energy, machines; elasticity; mechanics of solids and liquids. Three class periods, one demonstration lecture, one three-hour laboratory period. Black, "College Physics". (4 class hours, 3 laboratory hours.)

**AST. 12. Basic Electricity.**

Electrostatics; units; current electricity; magnetic, chemical and thermal effects; series and parallel circuits, networks; induced electromotive forces, generators and motors; alternating currents; instruments; electronics. Three class periods, one demonstration lecture, one three-hour laboratory period. Black, "College Physics". (4 class hours, 3 laboratory hours.)

**AST. 61. Mechanics.**

Mechanics of point masses and of rigid bodies; elasticity; mechanics of fluids. Three class periods, one demonstration lecture, one three-hour laboratory period. Hausmann and Slack, "Physics". (4 class hours, 3 laboratory hours.)

**AST. 62. Electricity and Magnetism.**

Electrostatics, current electricity, Ohm's law, electric circuits, electromagnetism, induced electromotive forces, etc. Three class periods, one demonstration lecture, one three-hour laboratory period. Hausmann and Slack, "Physics". (4 class hours, 3 laboratory hours.)

**AST. 304. Mechanics.**

Mechanics of point masses and of rigid bodies; elasticity; mechanics of fluids. Three class periods, one demonstration lecture, one three-hour laboratory period. Hausmann and Slack, "Physics". (4 class hours, 3 laboratory hours.)

## **General Information**

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## SUMMER SESSIONS

The courses offered during the 1944 Summer Sessions were arranged in two groups: (1) The regular session of six weeks, June 26 to August 5, designed primarily for graduate students, teachers, and adults interested in special college work; (2) a post-session from August 7 to August 26, consisting exclusively of courses in Education. All Summer Session courses are open to both men and women.

The Summer Session Announcement containing a full description of courses to be offered in 1945 together with information concerning admissions, fees, etc., will be sent on request to the Director of the Summer Session. The following courses were offered in the Summer of 1944.

### SUMMER SESSION COURSES

#### REGULAR SUMMER SESSION

June 26 to August 5, 1944

Educ. 173	Diagnostic and Remedial Teaching .....	(3)
Educ. 190	Visual Instruction .....	(3)
Educ. 266	Supervision of Instruction .....	(3)
Educ. 272	Tests and Measurements .....	(3)
Educ. 293-4	Individual Research .....	(3)
Engl. 118	American Literature .....	(3)
Engl. 120	The Novel .....	(3)
Engl. 220	Graduate Seminar .....	(3)
Engl. 229	Literary Criticism .....	(3)
Engl. 232	Graduate Thesis .....	(3)
Speech 161	Dramatic and Speech Interpretation for the Teacher....	(3)
Fr. 1	Elementary French .....	(3)
Hist. 151	Pro-Seminar in the History of the United States and Pennsylvania For Teachers .....	(3)
Hist. 217	America As a World Power .....	(3)

#### POST-SESSION

August 7 to August 26

Educ. 151	Organization of Materials of Instruction .....	(3)
Educ. 296	Seminar in School Administration—Personnel.....	(3)

## PROGRAM IN GENERAL EDUCATION

A program in general education, inaugurated in 1936, provides an opportunity for those students who desire to read either for the purpose of broadening their range of intellectual interests or to pursue some special line of reading not available in regular classroom instruction. Students participating in this program are afforded an opportunity to discuss not only their reading but also their intellectual problems in general with a faculty adviser with whom they come to feel a personal relationship. The independent pursuit of knowledge and the intellectual self-development of the student comprise the aim of the program.

The advisory council for general education, consisting of a group of faculty members with special aptitude for this work, is in charge of the program in general education. Each year the council formally invites the members of the freshman class to apply for enrollment in the program, but any student in the University may at any time apply to the chairman of the council for admission. No university credit toward a degree is allowed for this work and there are no regular hours or assignments. The conduct of the work is entirely at the direction of the student and his faculty adviser. Only those students, however, who appear able to profit by the program are admitted.

There is no fee in connection with the work of the program in general education.

## RELIGIOUS OBSERVANCES

### Chapel

Voluntary devotional exercises are held at stated times in Packer Memorial Church. Opportunity is given groups of students to arrange chapel programs in conformity with their accustomed modes of religious observance and worship. Any group of students who are members and adherents of any recognized Christian faith may arrange, under the general supervision of the university chaplain, either regular or occasional religious exercises in Packer Memorial Church for themselves and such others as may desire to attend. These assemblies may be held at any appropriate time when those interested may be free to attend and when the church may not be occupied by regular university or other exercises previously scheduled. The university chaplain is glad to cooperate with any such group in making arrangements.

## STUDENTS' HEALTH SERVICE

The students' health service has general charge of all health and sanitary measures in the University. The work of the department is organized under four heads: sanitation, physical examinations, dispensary service, education.

**SANITATION.** The director of the health service is in direct charge of the sanitation of university buildings and grounds, and exercises such supervision as is possible over other accommodations for students.

**PHYSICAL EXAMINATIONS.** Each student is required to undergo a complete physical examination each year. This examination, which is made jointly by the health service and the department of physical education, serves the needs of both these departments and also complies with the requirements of the Reserve Officers' Training Corps. All physical defects and departures from normal are noted, and the students are divided into groups as follows: (1) those who present no abnormalities and who can proceed with the regular mental and physical work of the University, (2) those who are subnormal rather than abnormal and who should be brought up to normal by the regular courses in physical education, (3) those who require special or corrective treatment.

Students who fall into groups 2 and 3 are observed at regular intervals, and every effort is made to bring them up to the highest degree of physical development and health. Individual records are kept of the progress of each case.

**DISPENSARY SERVICE.** The health service maintains a dispensary in Saucon Hall where students may receive treatment for minor illnesses and injuries. The dispensary hours are from 8:30 a.m. to 12:00 m. on all week days, from 1:30 to 5:00 p.m. on week days except Saturday, and from 10:00 a.m. to 12:00 m. on Sunday. A physician and a nurse are on duty in the dispensary during these hours. While the health service does not furnish medical attendance to students who are sick in their rooms, the directors keep in touch with such cases by telephone and otherwise in so far as is possible in order to see that the students are receiving proper attention and that the time lost from university work is minimized. It is requested that all such cases, together with the names of the attending physician, be reported to the

director in order that complete records of the health of the students may be kept.

**EDUCATION.** A course in personal and social hygiene is given to freshman under the joint responsibility of the health service and the department of biology. In this course emphasis is laid on those points of personal hygiene most applicable to the student recently deprived of the atmosphere and influences of home. In social hygiene an effort is made to disseminate correct information concerning the history and present status of social diseases and the effectiveness of approved methods for the relief of existing conditions. This phase of the health service constitutes a specific part of the general program of instruction recommended by the State Board of Health and by other recognized organizations for the promotion of social hygiene.

## PLACEMENT BUREAU

The University maintains a placement bureau for the performance of three major functions: student part-time aid, senior placement, and alumni placement.

Although the bureau does not guarantee employment, it is ready to aid students and alumni in every possible way to secure desired work.

**STUDENT PART TIME AID.** Students who are in need of financial assistance are aided in securing employment on the campus and in the community. Through the cooperation of the faculty and the local merchants, many of the students are able to continue their courses in college, which would not be possible without such aid from the placement bureau.

Seldom can a student, even though he possess unusual mental capacity and physical vigor in addition to extraordinary industry, hope to earn all of his expenses. Even with provision for his tuition, such a student will find it difficult to earn enough to care for his other expenses. An extensive money-earning program is a mistake unless it is absolutely necessary, but a modest program is possible for those students who have determination and the willingness to endure the hardships which accompany such a program.

**SENIOR PLACEMENT.** During the second semester the placement bureau and the directors of curricula receive the personnel

representatives of many industries and business houses, on the campus. These representatives are provided with facilities for interviewing seniors, with the result that a large portion of the seniors secure positions which they assume upon graduation.

In addition to securing interviews on the campus for seniors, many interviews are arranged for them at the offices of companies which do not send personnel representatives to the campus.

The work of the placement bureau does not cease at commencement time, but continues all year. The combined efforts of the placement bureau, the directors of curricula, and the seniors themselves, result yearly in the placement of practically all graduating seniors who seek employment.

**ALUMNI PLACEMENT.** The placement bureau acts as a clearing house for the placement of alumni who are seeking employment or better positions. During the course of the year, many alumni find employment through this service.

## FINANCIAL AID

### SCHOLARSHIPS AVAILABLE TO FRESHMEN

#### I. Competitive Regional Scholarships

1. Lehigh University offers each year ten competitive scholarships valued at \$1, 600 each for four years of college work. These scholarships cover tuition in the College of Arts and Science, the College of Business Administration, or the College of Engineering. The scholarships once assigned will continue in force for the full four years of the student's residence at Lehigh University, unless he shall fail to meet the scholastic average of 2.50 or better and the qualifications of a good citizen. These scholarships are given strictly on merit and irrespective of the need for financial aid.

2. In order to compete for one of these scholarships, a freshman candidate must take the following steps:

(a) Write a letter to the office of admissions, Lehigh University, Bethlehem, Pennsylvania, indicating his intention to compete, and requesting a form on which to submit his application. The application should be received by the office of admissions before March 1 of the calendar year in which the applicant expects to enter Lehigh University.

(b) Submit a satisfactory record of his secondary school preparation, which must meet all entrance requirements for the particular college he wishes to enter. A preliminary record must be submitted on forms which will be provided, as soon as possible after the close of the first semester of the senior or final year of secondary school preparation.

(c) Submit on the form provided a complete record of his secondary school extracurricular activities, to which should be added information regarding any important piece of creative work, independent study, or other notable accomplishments which do not appear in his regular record submitted for admission. His guidance officer must attest the accuracy of this record.

(d) Ask his principal or headmaster to send to the office of admissions, Lehigh University, a general character recommendation and a general estimate of his fitness to do college work.

(e) Compete in certain examinations offered under the auspices of the College Entrance Examination Board, namely, a Scholastic Aptitude Test and a Scholastic Achievement Test. (In 1943 these tests will be given on Saturday, April 10.)

Awards will be made in the order of the contestants' ratings on such weighted factors as preparatory school scholastic record, evidences of effective leadership and distinguished group service, character and personality, and performance in the competitive examinations, the last factor being the most heavily weighted. Awards will be assigned geographically, two each to the New England States and the Middle Atlantic States, three to the South-eastern States, and three at large. However, if in any year the winning candidate or candidates in some area do not show a total weighted rating reasonably commensurate with the ratings of runners-up in other geographical divisions, one or more of the awards to that area may lapse for that year and be assigned to superior candidates from other geographical divisions.

Further details regarding the taking of the examinations and the records to be submitted will be forwarded to applicants upon request.

Address all communications to the office of admissions, Lehigh University, Bethlehem, Pennsylvania.

## II. Scranton Public High Schools Scholarships

Four scholarships, provided through the gifts of friends of Lehigh University, are to be awarded, one each year, to graduates of the public senior high schools of Scranton, Pennsylvania, of which there are now two, viz., Central High School and Technical High School. The scholarship is to cover the tuition fee of the holder thereof.

In the event that there should be no satisfactory applicants from any of the public senior high schools of Scranton in any given year, the scholarship for that year may be awarded to any satisfactory applicant residing in Scranton.

A scholarship award is to be renewed yearly to the initial holder thereof until he graduates, provided he remains in school and maintains a grade at least equal to the average of his class during the preceding year.

The following qualifications only are to be the basis of the award of the scholarships: (a) a good character; (b) need of pecuniary assistance; (c) high scholastic ability. The awarding of these scholarships will be administered through the committee on scholarships and loans.

At the discretion of the President, each scholarship may be divided into two or more partial scholarships totaling one full scholarship, so that two or more may benefit by any annual award.

If at any time the income from the funds should warrant, two scholarships may be awarded in one year. If at any time the accumulated income is not sufficient to pay the full amount of the tuition fee, the scholarship shall be awarded nevertheless, the balance being taken from the principal of the fund.

## III. General Undergraduate Scholarships

Freshmen are also eligible for free scholarships and deferred payment scholarship loans as described in the following section. Regular interest-bearing loans, as described below, are not available to freshmen or other students matriculating at the University for the first time.

**GENERAL UNDERGRADUATE SCHOLARSHIPS AND LOANS**

By authority of the board of trustees, a limited number of *free* scholarships are awarded annually to undergraduate students. The usual award amounts to \$200 and is applicable against tuition payments only, giving full and final remission of one-half of each semester's tuition charge. In exceptional cases an award may be made in the amount of \$400 to meet the full tuition charge.

*Deferred payment scholarship loans* are also available, either to supplement a free-half-tuition award when the applicant's scholarship rating is sufficiently high and when the economic situation of the applicant's family clearly warrants it; or given independently of any scholarship award as may be determined by the committee on scholarships and loans. For this loan the student signs a note, endorsed by his parents or guardian, binding him to repay the amount of the loan, such payment to begin at the latest within three months after graduation or withdrawal from the University, in instalments of \$15 per month the first year and \$20 a month thereafter until the debt is liquidated.

The basis of award for both *free scholarships* and *deferred payment scholarship loans* is: (a) financial need; (b) character and personality; (c) high scholastic achievement as evidenced by rank in school class and by performance in the April Scholarship Examinations of the College Entrance Examination Board; (d) leadership qualities and participation in school activities other than scholastic.

(a) The committee on scholarships and loans must be thoroughly convinced that the student is unable to pay his tuition in full or part and that, with the tuition aid granted, the student will be fully able to finance himself for the year with no serious difficulty. The burden of positive proof on these points is placed on the student. An inquiry form regarding financial status is a part of the application-for-aid form.

(b) Evidence must be presented of excellence of character and personality.

(c) The *minimum* scholastic requirement is, in the case of a freshman, rank in the top third of his graduating class in high school or preparatory school, and in the case of a university sophomore, junior, or senior, an average grade during the previous academic year of 2.00 or better. (Average grades

are computed by weighting A as 4, B as 3, C as 2, D as 1, and F as 0.) College Board scores are comparative; there is no minimum score required of candidates.

(d) Other factors being equal, preferential consideration may be given to the student who, in addition to making a meritorious scholastic record, has also been able to demonstrate successful leadership in one or more non-scholastic activities in school or on campus.

A student transferring from another four-year college, unless he has been graduated, is not eligible to apply for a scholarship or deferred payment scholarship loan until he has completed one year at Lehigh University.

A student entering from a recognized junior college with full transferred credits (junior year standing) may be a candidate for a free scholarship or a deferred payment scholarship loan, or both, on his junior college record.

Any scholarship or loan award is for one year only; but a student holding a scholarship or loan in any year may apply on his record for further award for the following year. Ordinarily his award will be continued unless his scholastic average is below 2.00.

A freshman who barely meets the minimum scholastic standard specified above is qualified to enter competition for financial aid; but funds available are awarded on a competitive basis, and a candidate who does not rank well up in the top fifth of his graduating class, or who has not achieved some distinction in non-academic activity, cannot hope for success in the competition.

In addition to awarding the scholarships and scholarship loans described above, the University makes interest-bearing loans from its endowed loan funds. Except for small amounts in unusual emergencies, such loans are made only to apply toward tuition, in cases of demonstrated need, satisfactory character and personality, and a scholastic record which is considered satisfactory although falling below the standard required for a scholarship award. Loans, other than the deferred payment scholarship loans referred to above, *are not available to new students—freshmen or transfer students with advanced credit.*

The maximum loan, in any one academic year, to a student with an average below 2.00 but 1.50 or over is \$300, and the maximum

loan to a student with an average below 1.50 is \$200. These are loans only for students who have been in the University one or more years.

No loan can be made to a student whose average is below 1.00, or who is on scholastic disciplinary probation, or who has been in residence less than one year.

The maximum indebtedness to the University which a student may normally be permitted to incur is \$800, i.e., the equivalent of deferred payment scholarship loans of \$200 each year for four academic years. The absolute maximum in exceptional cases is \$1,000.

*Time Limit for Repayment.* Every student incurring indebtedness to the University is required to undertake to pay his debt in full within five years after his graduation or withdrawal according to a schedule to be agreed upon. In case of the normal maximum debt of \$800 the payment should be completed within four years, as follows:

First year—12 monthly payments of \$15 .....	\$180
Second year—12 monthly payments of \$20 .....	240
Third year—12 monthly payments of \$20 .....	240
Fourth year—7 monthly payments of \$20 .....	140
	<hr/> \$800

*Interest on Deferred Payment Scholarship Loans.* Indebtedness incurred through deferred payment scholarship loans bears no interest so long as the student is in residence. From the date of graduation or withdrawal such indebtedness bears interest at the rate of 2% for the first year, 3% for the second year, 4% the third, 5% the fourth year, and 6% thereafter.

*Interest on Loans.* Loans from the loan funds bear interest at 6% from the date of the loan.

*Acceptance and Deposit.* All students to whom scholarships or loans of any kind are awarded are required to signify within ten days their acceptance of such award and their intention to register in Lehigh University at the next registration period, and to accompany this notice of acceptance and intention with a check or money order for \$25; this amount to be applied at registration against incidental and laboratory fees, but to be non-returnable in case of non-registration.

*Application.* Candidates for scholarships or loans must make application on forms provided by the committee on scholarships and loans. Candidates not previously enrolled in the University should write for the form to the director of admissions; candidates who have been enrolled in the University one semester or longer should write to the dean of undergraduates. Dates for filing applications are:

1. Before March 1 for freshman and transfer students from other colleges.
2. Before May 15 for sophomores, juniors, or seniors who have been on the campus for one or more years. Applications for free tuition scholarships and deferred payment scholarship loans *must be received before May 15*, but it is to a candidate's advantage to send in his application for these by May 1. All requests must be based on a budget for at least a *full academic year* (two semesters). If a student is on the accelerated program he should include any request for aid during the summer semester with request for fall and spring semester aid, if such is also needed.

Any application for scholarship aid not conforming to the above procedure can be given consideration only if received one full month in advance of the date of registration for the semester concerned.

#### **SCHOLARSHIPS FOR UNDERGRADUATES PREVIOUSLY ENROLLED**

##### **The Ray Sands Nostrand Memorial Scholarship**

The Ray Sands Nostrand Memorial Scholarship was established by the late Benjamin Nostrand, Jr., M.E., '78, in memory of his son, Ray Sands Nostrand, '17. The income from this fund is awarded to students of the University. The requirements governing the award of university scholarships apply likewise to this scholarship.

##### **The Fred. Mercur Memorial Fund Scholarship**

Friends of the late Frederick Mercur, of Wilkes-Barre, Pa., General Manager of the Lehigh Valley Coal Company, desiring to establish a memorial of their friendship and esteem, and to perpetuate his memory, contributed and placed in the hands of the trustees of the University a fund called the Fred. Mercur Memor-

ial Fund. The income from this fund is awarded to students of the University. The requirements governing the award of university scholarships apply likewise to this scholarship.

**The Henry S. Haines Memorial Scholarship**

Mrs. Henry S. Haines, of Savannah, Ga., established in 1889 a scholarship of the annual value of \$100.00 as a memorial to her son, Henry Stevens Haines, M.E. '87. By the terms of the bequest this scholarship is awarded to a student in the curriculum in mechanical engineering. The requirements governing the award of university scholarships apply likewise to this scholarship.

**The William S. Cortright Memorial Scholarship**

Mrs. William S. Cortright established in 1938 a fund, the income from which provides a scholarship annually in memory of her husband who graduated from Lehigh University in 1872. By the terms of the bequest this money is to be used for the maintenance of a part tuition scholarship to be awarded to a student who is a resident of Bethlehem or the immediate vicinity and who is enrolled in the curriculum of mechanical engineering. The award is to be made by the committee on scholarships and loans under the regular requirements governing the award of other university scholarships.

**The Natt Morrill Emery Scholarship**

Established in memory of the late Natt Morrill Emery, vice-president and controller of Lehigh University, by an alumnus and former student of Dr. Emery's, the Natt Morrill Emery Scholarship covers the full tuition fee. It will be awarded by Lehigh University every four years (or whenever it becomes vacant) from 1940 to 1956 inclusive to that graduate of the high schools of Richmond, Virginia, selected by the Richmond school authorities, who during his scholastic career has exemplified in character and conduct the qualities of loyalty and ability which marked the services of Dr. Emery to Lehigh University.

**The Murtha P. Quinn Scholarship**

Mr. Murtha P. Quinn left one-thirtieth of his residual estate to Lehigh University for the purpose of establishing a free tuition scholarship in the amount of \$400.00 annually. Preference is to be given to students whose homes are in South Bethlehem.

### LOAN FUNDS

#### The Eckley B. Coxe Memorial Fund

In memory of the late Eckley B. Coxe, trustee of the University, Mrs. Coxe established a fund, amounting to \$70,000.00, the interest of which is used, under the direction of the trustees of the University, and subject to such regulations as they may adopt, for the assistance of worthy students requiring financial aid.

#### The Frank Williams Fund

Frank Williams, B.S. '87, E.M. '88, who died in October, 1900, bequeathed to the University the greater part of his estate to found a fund, now amounting to \$245,000.00, the income of which is lent to deserving students.

#### The Frazier and Ringer Memorial Fund

The Frazier and Ringer Memorial Fund was established in 1906 by the late Robert H. Sayre, in memory of Benjamin West Frazier, A.M., Sc.D., former professor of mineralogy and metallurgy, and Severin Ringer, U.J.D., former professor of modern languages and literature and of history, each of whom served Lehigh University for one-third of a century. The income of this fund and payments made by former borrowers are available for loans to cover the medical and surgical care of worthy students.

#### The President's Fund

The President's Fund was established during the early years of the University for the help of deserving students. As payments are made by former beneficiaries, they are immediately available for the assistance of students of the University.

### GRADUATE SCHOLARSHIPS

#### University Scholarships

The board of trustees has authorized the annual award, to graduate students, of twelve full free scholarships, on the basis of superior qualifications, and twelve deferred payment scholarship loans, on the basis of qualification and need. In general these scholarships are administered under regulations similar to those given above under the heading "General Undergraduate Scholarships and Loans." Inquiries should be addressed to the dean of the Graduate School.

### The William C. Gotshall Scholarships

Nine scholarships were provided by a bequest from the late William C. Gotshall for worthy graduate students in any branch or course of engineering offered at Lehigh University. Appointment is for one year with an annual stipend of \$500 with exemption from the university tuition fee. No duties other than graduate study are required of the holders.

### ENDOWMENT OF SCHOLARSHIPS

Undergraduate or graduate scholarships named to honor an individual or corporation may be established in perpetuity through the payment to the board of trustees of Lehigh University of \$10,000.00. The income from this donation will be paid to the holder of the scholarship to be applied toward the payment of university fees. The University does not, however, guarantee that this income will be forever sufficient to pay such fees in full.

### PRIZES

Owing to the decreased return on invested funds, the income available for payment of prize awards may be insufficient to pay the amounts originally designated and planned by the donor. The University reserves the right to make such adjustments as may be necessary.

#### The Wilbur Scholarship

The Wilbur Scholarship, founded in 1872 by the late E. P. Wilbur, provides the sum of \$200.00 which is awarded annually to the sophomore with the best record for the sophomore year.

#### The John R. Wagner Award

The John R. Wagner Award was established by the widow of John R. Wagner, Lehigh, 1885, in memory of her husband. The sum of \$15 is awarded on Founder's Day each year to the junior student in mechanical engineering whose scholastic record is the highest in his class in the freshman and sophomore years and whose character and life purposes are deemed deserving and worthy.

#### The Wilbur Prizes

A fund was established by the late E. P. Wilbur for distribution in prizes as the faculty may determine. This fund yields an annual

income of \$100, which is used at present to provide awards as follows:

Wilbur Prizes, Freshman Year—a first prize of \$15 and a second prize of \$10 to the highest ranking and second highest ranking freshman in mathematics; prizes of \$15 each to the highest ranking freshman in English, German, and French.

Wilbur Prizes, Sophomore Year—prizes of \$10 to the highest ranking sophomores in mathematics, English and physics.

**The John B. Carson Prize**

An annual prize of \$50.00 was established by Mrs. Helen Carson Turner, of Philadelphia, Pa., in memory of her father, John B. Carson, whose son, James D. Carson, was a graduate of the civil engineering curriculum of Lehigh University in 1876. It is awarded to that senior in civil engineering who shows the most marked excellence in the professional courses of his curriculum.

**The William H. Chandler Prizes in Chemistry**

Four annual prizes of \$25.00 each, one in each class, for excellence in the curricula in chemistry and chemical engineering, were established by Mrs. Mary E. Chandler, of Bethlehem, Pa., widow of Dr. William H. Chandler, who was professor of chemistry at Lehigh University from 1871 until his death in 1906. In memory of Dr. Chandler the faculty named the prizes the William H. Chandler Prizes in Chemistry.

**The Electrical Engineering Prize**

An annual prize of \$15.00, established by an anonymous graduate of the curriculum in electrical engineering, is awarded to the member of the sophomore class in electrical engineering having made the best record in the work of the sophomore year.

**The Philip Francis duPont Memorial Prize  
in Electrical Engineering**

The Philip F. duPont Memorial Prize Fund was established in 1929 by L. S. Horner, E.E. '98. The annual income of this fund is awarded each year in the way of prizes, two-thirds to the highest ranking senior and one-third to the second highest ranking senior in electrical engineering, the course from which Mr. Horner was graduated.

### The Horn Prize

The heirs of Harold J. Horn, E.E. '98, established a fund, the income of which is used in the award of two prizes of \$10.00 and \$5.00 for the best work in senior Electrical Engineering Proseminar.

### Alumni Prizes

Funds are provided by the alumni association for the annual award of four prizes of \$25.00 each. Two prizes are awarded to the highest ranking juniors in the College of Engineering, one to the highest ranking junior in the College of Arts and Science, and one to the highest ranking junior in the College of Business Administration.

### The Williams Prizes in English

The late Professor Edward H. Williams, Jr., an alumnus of the University of the class of 1875, established prizes for excellence in English composition and public speaking. The freshman, sophomore, and junior prizes are awarded by the faculty on the recommendation of the department of English.

**SOPHOMORE COMPOSITION PRIZES.** A first prize of \$50.00, a second prize of \$25.00, and a third prize of \$15.00 are awarded annually for the three best compositions submitted by sophomores of regular standing as required work in their English courses.

**JUNIOR COMPOSITION PRIZES.** A first prize of \$50.00, a second prize of \$25.00, and a third prize of \$15.00 are awarded for the three best essays submitted by juniors as part of the required work in their courses in English.

### The Williams Senior Prizes

The Williams Senior Prizes are awarded by the faculty on the recommendation of the committee on Williams Senior Prizes.

1. First prizes of \$100.00, second prizes of \$50.00, and third prizes of \$25.00 are awarded annually in each of the five fields of economics, English, philosophy, psychology, and history and government for dissertations submitted by regular members of the senior class on or before May 1.

2. The committee on Williams Senior Prizes publishes, before the close of the university year, a list of recommended subjects

for dissertations, but a senior may submit a dissertation upon any other subject in the respective fields if the subject has received the approval of the committee.

3. Each senior entering the competition shall submit to the committee his choice of subject and plan of work by December 1.

4. The awards are made by the faculty upon recommendation of the committee, but no award is made if in any case a dissertation does not meet the standards of merit established by the committee. This standard includes such points as excellence in thought, plan, development, argument, and composition.

#### **The Williams Prizes in Intramural Debating**

Sums totalling \$200 are awarded annually as prizes in intramural debating. Students engaged in this activity are organized under the direction of the department of English into teams, which compete as units in a series of debates held throughout the year. The sum of \$120 is divided equally between the two members of the winning team, the sum of \$80 between the two members of the runner-up. Winners of first prizes may not compete in the next succeeding year.

#### **The Williams Prizes in Extempore Speaking**

A first prize of \$50.00 and a second prize of \$25.00 are awarded to freshmen of regular standing who excel in a contest in extempore speaking held in May of each year.

A first prize of \$75.00, a second prize of \$50.00, and a third prize of \$25.00 are awarded annually to the winners in a contest in extempore speaking for juniors and seniors. Winners of first prizes are not eligible to compete in subsequent years.

#### **The Robert W. Blake Memorial Prizes**

The Robert W. Blake Memorial Prizes are awarded at the Founder's Day exercises to freshmen enrolled in the program for general education. The prize committee (for the advisory council for general education) is composed of Professors Palmer and Diamond. The income from the Robert W. Blake Memorial Fund is devoted to the purchase of books awarded as prizes on conditions prescribed by the advisory council for general education.

### The Goodman Prize in Fine Art

An annual prize of \$25.00 has been provided by Mrs. David J. Goodman, to be awarded to a student enrolled in the Department of Fine Arts. Any student is eligible for the prize who has taken two semesters of work in the department of Fine Arts, and has shown special ability in creative work or in critical appreciation in the field as demonstrated by his classroom work and personal achievement. No student may be awarded the prize more than once.

### Scholarship Cups

**PHI ETA SIGMA CUP.** The Phi Eta Sigma honorary freshman fraternity awards annually a scholarship cup to the living group whose freshmen (not fewer than five) have made the highest scholastic average for the year.

**INTERDORMITORY SCHOLARSHIP CUP.** The interdormitory council has provided a scholarship cup which is awarded for one year to the dormitory section having the highest scholarship average for the preceding year.

**PHI SIGMA KAPPA SCHOLARSHIP CUP.** The Phi Sigma Kappa social fraternity has provided a scholarship cup which is awarded for one year to the fraternity in the interfraternity council having the highest scholarship average for the preceding year. The cup becomes the permanent property of the fraternity winning it for three successive years.

**TRUSTEES' SCHOLARSHIP CUP.** The trustees of the University have provided a scholarship cup which is awarded for one year to the living group having the highest scholarship average for the preceding year. The trustees' scholarship cup becomes the permanent property of any living group winning it for three successive years.

### Prizes Awarded by Student Organizations

**TAU BETA PI PRIZE.** The Tau Beta Pi honorary engineering fraternity awards a slide rule each year to the technical freshman having the highest scholastic average.

**ETA SIGMA PHI PRIZE.** The Eta Sigma Phi classical fraternity awards a cash prize of \$10.00 to that student doing the best work in sophomore collegiate Latin.

**Pi TAU SIGMA PRIZES.** The Pi Tau Sigma honorary fraternity in mechanical and industrial engineering awards each year a mechanical engineers' handbook to the highest ranking freshman in the curricula in mechanical engineering and industrial engineering respectively.

**ETA KAPPA NU PRIZE.** The Eta Kappa Nu honorary fraternity in electrical engineering awards a handbook in electrical engineering to the highest ranking freshman in the curriculum in electrical engineering.

**AMERICAN SOCIETY OF CIVIL ENGINEERS JUNIOR MEMBERSHIP PRIZE.** The Lehigh Valley Section of the American Society of Civil Engineers offers a prize of a junior membership in the American Society of Civil Engineers to the highest ranking senior in civil engineering holding membership in the student chapter.

**AMERICAN SOCIETY OF MECHANICAL ENGINEERS JUNIOR MEMBERSHIP PRIZE.** The Anthracite-Lehigh Valley Section of the American Society of Mechanical Engineers awards annually a prize of the value of \$10.00 to an outstanding member of the Lehigh Student Branch of the A. S. M. E. This prize takes the form of junior membership for one year in the parent society.

**AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS STUDENT MEMBERSHIP PRIZE.** The Lehigh Valley Section of the American Institute of Electrical Engineers awards annually to a member of the graduating class in electrical engineering, who has given outstanding service to the Student Branch of the AIEE, a prize consisting of a one year student membership in the AIEE.

**AMERICAN CHEMICAL SOCIETY AWARD.** The Lehigh Valley Section of the American Chemical Society awards a membership in the American Chemical Society and a subscription to a journal of this society to the highest ranking senior in chemistry or chemical engineering.

**AMERICAN INSTITUTE OF CHEMISTS MEDAL.** The American Institute of Chemists has established annual student medal awards to senior students majoring in chemistry in designated institutions. Each award carries with it a junior membership in the American Institute of Chemists.

## ORGANIZATIONS

### Honorary Scholarship Societies

PHI BETA KAPPA. Students in the College of Arts and Science and the College of Business Administration who up to the middle of the senior year maintain high scholarship may be elected to membership; also a limited number of engineering students whose work in philosophical, scientific, and language studies is of high grade.

TAU BETA PI. This national honorary society, which now has seventy-one chapters, was founded at Lehigh University in 1885 by Professor E. H. Williams, Jr. Students in the College of Engineering may be elected to membership during their junior and senior years if they have maintained high scholarship.

SIGMA XI. Election to membership is based upon the completion of original and noteworthy research in pure or applied science and the publication of the results thereof. Ordinarily undergraduates are eligible to associate membership only, their election being based upon their promise of achievements in scientific research.

### Other Honorary Scholarship Societies

- ALPHA EPSILON DELTA (pre-medical)
- ETA KAPPA NU (electrical engineering)
- ETA SIGMA PHI (classics)
- PHI ALPHA THETA (history)
- PHI ETA SIGMA (freshman)
- PI MU EPSILON (mathematics)
- PI TAU SIGMA (mechanical engineering)
- ROBERT W. BLAKE SOCIETY (philosophy)

### Course Societies

Intellectual interest in various fields of study and professional spirit among pre-medical, business, and engineering students is promoted by a group of organizations commonly called course societies. The first of these organizations historically was the Chemical Society, established in 1871. The list now includes:

## ORGANIZATIONS

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### **In Arts and Science**

Delta Omicron Theta (public speaking)  
Ernest W. Brown Astronomical Society  
International Relations Club (history and government)  
Newtonian Society (mathematics)  
Robert W. Hall Pre-Medical Society

### **In Business Administration**

Alpha Kappa Psi (professional fraternity in business administration)  
Lambda Mu Sigma (marketing)

### **In Engineering**

Chemical Society  
Student Chapter of the American Society of Civil Engineers  
Electrical Engineering Society (student branch of the American Institute of Electrical Engineers)  
Fritz Engineering Research Society  
Industrial Engineering Society  
Mechanical Engineering Society (student branch of the American Society of Mechanical Engineers)  
Metallurgical Society  
Mining and Geological Society (student branch of the American Institute of Mining and Metallurgical Engineers)  
Physics Club  
Radio Club

### **Other Organizations**

Other student organizations include:  
Alpha Lambda Omega  
Alpha Phi Omega (national service scouting fraternity)  
Alpha Town House (independent living group)  
Arcadia (student self-government council)  
Army Ordnance Association (Lehigh Post)  
Brown Key Society (letter men)  
Canterbury Club (religious)  
Chess Club

Combined Musical Clubs  
Cosmopolitan Club  
Cut and Thrust Society (fencing)  
Cyanide Club (junior honorary society)  
Lehigh Collegians (dance orchestra)  
DeMolay Club  
Glee Club  
Golf Club  
Ice Hockey Club  
Interdormitory Council  
Interfraternity Council  
Lacrosse Club  
Lehigh Camera Club  
Lehigh University Band  
Lehigh Keystone Society  
Mustard and Cheese (dramatic club)  
Omicron Delta Kappa (senior honorary fraternity)  
Pi Delta Epsilon (honorary journalistic fraternity)  
Rifle Club  
Scabbard and Blade (honorary military fraternity)  
Shop Club (hobbies)  
Ski Club  
Spiked Shoe (honorary fraternity, track athletics)  
Sportsmen's Club  
Student Concerts-Lectures Committee  
Symphony Orchestra  
Tone (music)  
Town Council (off-campus living groups)  
Yacht Club

The following Greek letter fraternities have chapters at Lehigh University: Alpha Chi Rho, Alpha Kappa Pi, Alpha Tau Omega, Beta Theta Pi, Chi Phi, Chi Psi, Delta Phi, Delta Sigma Phi, Delta Tau Delta, Delta Upsilon, Kappa Alpha, Kappa Sigma, Lambda Chi Alpha, Phi Delta Theta, Phi Gamma Delta, Phi Sigma Kappa, Pi Kappa Alpha, Pi Lambda Phi, Psi Upsilon, Sigma Alpha Mu, Sigma Chi, Sigma Nu, Sigma Phi, Sigma Phi Epsilon, Tau Delta Phi, Theta Chi, Theta Delta Chi, Theta Kappa Phi, Theta Xi.

### Student Publications

The students of Lehigh University publish a semi-weekly college newspaper, *The Lehigh Brown and White*; a monthly magazine, *The Lehigh Bachelor*; a year book, *The Epitome*; an annual *Freshman Handbook*; and an annual *Directory of The Interfraternity Council*.

## ALUMNI ASSOCIATION

The Alumni Association, which has been in existence since 1876, was incorporated in 1917 under the name the Alumni Association of the Lehigh University, Inc. The offices of the association are in the Alumni Memorial Building. Along with the regular alumni activities, the association is largely concerned with raising money to meet the needs of the University.

The officers of the Alumni Association for 1944-45 are:

President, George R. Brothers, '08, of Ware Neck, Va.

Vice-President, Linwood H. Geyer, '15, of New York, N. Y.

Vice-President, John McC. Latimer, '18, of Pittsburgh, Pa.

Treasurer, Robert S. Taylor, '95, of Bethlehem, Pa.

Executive Secretary, Robert F. Herrick, '34, of Bethlehem, Pa.

Assistant Secretary and Editor of *Lehigh Alumni Bulletin*,

Leonard H. Schick, '37, of Bethlehem, Pa.

Archivist, Arthur W. Klein, '99, of Bethlehem, Pa.

The following are the alumni clubs: New York Lehigh Club, Philadelphia Lehigh Club, Pittsburgh Lehigh Club, Chicago Lehigh Club, Washington, D. C. Lehigh Club, Detroit Lehigh Club, Cincinnati Lehigh Club, Northeastern Pennsylvania Lehigh Club (Scranton and Wilkes-Barre, Pa.), Maryland Lehigh Club (Baltimore, Md.), Youngstown (O.) Lehigh Club, Lehigh Club of New England (Boston, Mass.), Lehigh Club of Central Pennsylvania (Harrisburg, Pa.), Lehigh Club of Northern New York (Schenectady, N. Y.), Lehigh Club of Central New York (Rome, N. Y.), Lehigh Club of Northern Ohio (Cleveland, O.), Lehigh Club of Southern New England (Hartford, Conn.), Lehigh Club of Western New York (Buffalo, N. Y.), Lehigh Home Club (Bethlehem, Pa.), Lehigh Club of China (Shanghai, China), Lehigh Club of Southeastern Pennsylvania (Reading, Pa.), Le-

high Club of Central Jersey (Trenton, N. J.), Lehigh Club of York (Pa.), Lehigh Club of Northern New Jersey (Newark), Lehigh Club of Northern California (San Francisco), Lehigh Club of Southern California (Los Angeles), Lehigh Club of Delaware (Wilmington), Lehigh Club of Monmouth County, N. J.

## BUILDINGS AND GROUNDS

The University occupies twenty-three buildings and grounds covering one hundred eighty acres on the north side of South Mountain, overlooking the valley of the Lehigh River and the city of Bethlehem. In addition, the University has an athletic field of ten acres in area with field house, gymnasium, and covered grandstand, located about a mile from the university campus.

### Packer Hall

Packer Hall is a four-story sandstone building, 215 feet long and 60 feet wide.

The department of civil engineering occupies the greater part of the first and second floors. The instrument rooms contain transits, levels, a large geodetic theodolite, plane tables, and other instruments for engineering field work. In the department headquarters is a collection of plans of engineering structures.

The departments of mathematics and astronomy, philosophy, education, and psychology are located in this building. The psychology laboratory has the standard equipment for the several courses in experimental psychology and for research.

### The William H. Chandler Chemistry Laboratory

The Chemistry Laboratory is a three-story fire-proof sandstone building, 259 feet long and 44 feet wide, with a wing 62 feet long and 42 feet wide, and with a three-story extension 60 feet long and 37 feet wide. An additional three-story wing 116 feet long by 52 feet wide has been added to the east of the original building.

Laboratory space and equipment are provided for qualitative and quantitative analysis, inorganic chemistry, organic chemistry, sanitary chemistry, industrial biochemistry, colloid chemistry, X-ray analysis, gas analysis, the furnace assay of ores, industrial chemistry, chemical engineering, and research in chemistry and

chemical engineering. A chemistry museum is located in this building.

The trustees of the University named this building, exclusive of the new east wing, the William H. Chandler Chemistry Laboratory in recognition of Dr. Chandler's thirty-five years' service as professor of chemistry, 1871-1906. The trustees have named the east wing the Harry M. Ullmann Chemistry Laboratory, in recognition of his service as head of the chemistry department.

#### **The Physics Laboratory**

The Physics Laboratory is a four-story sandstone building, 240 feet long and 44 to 56 feet wide. This building is devoted entirely to the department of physics. Apparatus and other facilities are provided for lecture and laboratory inspection and research. In addition to offices, recitation rooms, and lecture rooms there are several large laboratory rooms, a reading room, machine shop, wood working shop, glass-blowing room, constant-temperature rooms, storage battery room, sound-proof rooms, dark rooms, and several research laboratories. The building is equipped throughout with water, gas, compressed air, and electric power outlets.

#### **The W. A. Wilbur Engineering Laboratory and Power House**

The W. A. Wilbur Engineering Laboratory and Power House is a two-story sandstone building, 188 feet long and 44 feet wide.

The power plant contains four Babcock and Wilcox straight-tube cross-drum boilers, each rated at 300 boiler horse power, four Coxe chain grate stokers, two turbine driven Sturtevant blowers, and coal, water, and ash handling equipment of modern design. The plant is designed and equipped to provide steam at 250 lbs. pressure to the engineering laboratories, in addition to heating the university buildings. It is so arranged that any boiler can be isolated for laboratory tests for long periods if necessary. From this plant a six-inch line carries steam to the Packard Laboratory at the pressure desired for the laboratory work. Modern safety appliances and measuring equipment have been incorporated.

A coal-storage yard has room for two months supply of coal, and a system of belt conveyors and bucket-elevators is provided for receiving coal, dumping it on storage pile, and conveying it into the boiler room as needed.

**Williams Hall**

Williams Hall, the donation of Dr. Edward H. Williams, Jr., of the class of 1875, was so named by the trustees of the University in recognition not only of this gift but also of Dr. Williams' long continued and important service to the University as professor of mining and geology.

Williams Hall is a three-story brick building, 186 feet long and 70 feet wide. It contains the offices, class rooms, laboratories, departmental libraries, and museum collections of the departments of metallurgical engineering, geology, and biology.

**The Fritz Engineering Laboratory**

The late John Fritz, of Bethlehem, known as the father of the steel industry in the United States, a member of the original board of trustees of the University, gave to the University funds for the erection and thorough equipment of an engineering laboratory. The building was designed and erected under the personal supervision of Mr. Fritz. The building is equipped with a general testing section for testing iron and steel, a cement and concrete section, and a hydraulic section. The equipment is used by the civil engineering department in connection with its research projects and for instruction in mechanics of materials, hydraulics, and cement and concrete.

The Fritz Engineering Laboratory is of brick and steel frame construction, 115 feet long and 94 feet wide, with the main central section 65 feet in height, and two side sections of lesser height. An electrically-operated traveling crane, of 10-ton capacity, commands the entire central portion of the building in which the testing of large specimens is carried on.

The general testing section is equipped with an 800,000 pound Riehlé vertical screw testing machine, capable of testing columns 25 feet long or less, tensile specimens 20 feet long or less, and transverse specimens up to lengths of 30 feet; an Olsen universal testing machine of 300,000 pounds capacity; smaller machines for ordinary tension, compression, transverse, and torsion tests; a cold-bend testing machine, impact and fatigue machines, and a small machine shop. The hydraulics section is equipped with various tanks, weirs, pumps, and other apparatus for studying problems in hydraulics. The cement and concrete section has a large room for the making and testing of specimens and a room for the storage of materials.

#### The Eckley B. Coxe Mining Laboratory

The Eckley B. Coxe Mining Laboratory is a two-story sandstone building, 100 feet long and 75 feet wide. It is occupied exclusively by the department of mining engineering.

The building contains the office of the department of mining engineering, the main lecture room, a locker and wash room, a laboratory equipped for fuel research, a balance room, and shop.

On the lower main floor are two air compressors, rock drills, and a motor-generator set. The upper main floor has one section for crushing, grinding, and the preparation of samples, and for making sieving tests. The remainder of this floor is equipped with units for elementary and advanced laboratory work in ore dressing and coal preparation—ball mills, a rod mill, classifiers, jigs, concentrating tables, flotation machines, magnetic separators, and a Chance coal cleaner, together with auxiliary equipment such as float-and-sink apparatus, ore-dressing microscope, etc.

The lower second floor is equipped as a laboratory for the necessary analytical work in connection with ore dressing and coal preparation, and as a fuel technology laboratory for coal, gas and oil analysis. Part of the upper second floor is used as a departmental drafting room in connection with the courses in mine surveying and mining methods; the remaining portion is being equipped as a mine ventilation laboratory.

The laboratory was named by the trustees of the University in memory of Eckley B. Coxe, who was a pioneer and a leader in the profession of mining engineering in this country, and an active friend and valued trustee of the University from its early days until his death.

#### Christmas-Saucon Hall

Christmas-Saucon Hall is a three-story stucco building. It contains the office of the College of Business Administration, the offices, lecture rooms, and recitation rooms of the departments of English, accounting, economics and sociology, and finance, the offices and dispensary of the students' health service. Christmas Hall has historic interest as the first building of Lehigh University.

#### Coppée Hall

Coppée Hall is the headquarters of the College of Arts and Science. It contains the offices of the College of Arts and Science,

a lecture room, and the offices and recitation rooms of the departments of German, Latin, Greek, romance languages, history and government, and fine arts.

#### Sayre Observatory

The Sayre Observatory was the gift of the late Robert H. Sayre, one of the original trustees of the University.

The observatory contains an equatorial telescope of six inches clear aperture and of eight feet focus, by Elvin Clark; a zenith telescope of four and one half inches clear aperture; an astronomical clock, by William Bond & Son; a meridian circle; a prismatic sextant, by Pistor and Martins; an engineer's transit and a sextant by Buff and Buff. Students in practical astronomy receive instruction in the use of the instruments and in observation.

The land upon which the observatory stands, consisting of seven acres adjoining the original grant, was presented to the University by the late Charles Brodhead, of Bethlehem.

#### The Packer Memorial Church

The Packer Memorial Church, in which chapel services are held, was the gift of the late Mrs. Mary Packer Cummings, daughter of the founder of the University. It was built in 1887. Occasionally musical recitals and the annual Bach Festival are held in this building and it houses the scores, records, and phonograph of the College Music Set, the gift of the Carnegie Foundation.

#### The University Library

The original library building was erected by the founder of the University in 1877 as a memorial to his daughter, Mrs. Lucy Packer Linderman. The present library, constructed on three sides of the original building, is in the collegiate Gothic style of architecture. It contains five times the floor space of the old structure and affords shelving capacity for approximately 500,000 volumes. Space in the reading room and seminars and other special rooms is sufficient for about 500 readers. Adequate space for the cataloguing departments and other purely administrative functions of the library is provided, together with special rooms for the treasure collection and the Lehigh collection. There are eleven seminar rooms for advanced study. The building contains a browsing room and an art gallery. Individual cubicles are available in the stacks for advanced students and research workers.

258,000 volumes are now upon the shelves. The list of current periodicals numbers about nine hundred and eighty. The library is especially rich, for one of its size, in materials for research in history, American newspapers, and the history of early science, and in the files of technical journals. The library is a depository for government documents.

Small working reference collections for laboratory use are maintained by the departments of biology, geology, chemical, civil, mechanical, and mining engineering.

The library is open, except on holidays, from 8 a.m. to 10 p.m.; from 8 a.m. to 12 m. on Saturdays.

The use of the library, with privilege of borrowing books, is offered to all members of the University; faculty, students, and alumni. Students are allowed free access to the books and are encouraged to become familiar with methods of using a library for literary and scientific work. The privileges of the library are also extended to all qualified residents of the city. The library offers its service to the industries located in the community.

**The Eckley B. Coxe Memorial Collection**

In memory of Eckley B. Coxe, for many years a trustee of the University, Mrs. Coxe presented to the University his technical library consisting of 7,727 volumes and 3,429 pamphlets. As the working library of a man who was remarkable for the extent and thoroughness of his acquaintance with the whole field of applied science, this collection possesses great value for students of science and engineering.

**The Joseph W. Richards Collection**

The Joseph W. Richards Library of Metallurgy and Chemistry, consisting of about 3,000 volumes is located on the second floor of Williams Hall, and is open for use under the supervision of the department of metallurgy.

**The Lehigh Art Gallery**

Frequent exhibitions are held in the art gallery of paintings, watercolors, drawings, sculpture, photographs, or prints—chiefly by contemporary American and foreign artists. The University owns a small collection of prints and a few paintings, largely gifts of alumni and friends of the University; these are also exhibited from time to time. The Lehigh Art Gallery is a definite

part of the university's educational and cultural program. While intended primarily for the interest of students, the exhibitions are open freely to the public.

**Charles Russ Richards House**

The Charles Russ Richards House is a new four-story fire-proof dormitory which was completed September, 1938. It has accommodations for 144 students. It contains an adequate recreation room, a spacious lounge, two reception rooms for visiting friends, attractive single rooms, and a limited number of suites. The rates for the suites are \$200 a year for each occupant, for single rooms \$180 and \$190 a year, and for double rooms \$140 and \$150 a year for each occupant.

**Henry Sturgis Drinker House**

The Henry Sturgis Drinker House, a new four-story fire-proof dormitory, completed in September, 1940, has accommodations for 126 students. It is equipped with a recreation room, a spacious lounge, a reception room for visitors, very attractive single rooms, and a limited number of double rooms. The rates for the single rooms are \$180, \$190, and \$200 a year, and for the double rooms, \$140, \$150, and \$180 a year for each occupant.

**Eugene Gifford Grace Hall**

Eugene Gifford Grace Hall, named for the donor and devoted to sports and recreation, is a stone building, approximately 120 feet wide and 180 feet long. It provides a sports theater which also serves as an assembly room for the University with a seating capacity of about 3000. The upper floor consists of an armory drill floor, which is also available for the larger university dances and receptions. The building contains rooms for the band and orchestra, offices, athletic teams, and classrooms for the Reserve Officers' Training Corps. Promenade terraces at the level of the dance floor on three sides of the building afford views over the Lehigh Valley and of South Mountain.

**Charles Lewis Taylor House**

The Charles Lewis Taylor House, the gift of Mr. Andrew Carnegie, is a three-story concrete dormitory with accommodations for 145 students. There are suites of three rooms (a study and two adjacent bedrooms) for two occupants, and a few single rooms. The building was named Taylor Hall by Mr. Carnegie in honor of Charles L. Taylor, his former partner in business, a

graduate of the University of the class of 1876, and a trustee of the University. The rates for the suites of rooms are \$140 and \$115 a year for each occupant. The single rooms are \$50, \$75, \$92, \$104, and \$115 a year.

**Henry Reese Price House**

The Henry Reese Price House furnishes dormitory accommodations for thirty-eight students. It was named in honor of Dr. Henry R. Price, an alumnus of the University of the class of 1870, late president of the board of trustees. The rates vary from \$50 to \$135 a year for each occupant.

**Drown Memorial Hall**

Drown Memorial Hall was erected by friends and alumni as a memorial to the late Thomas Messinger Drown, LL.D., president of the University from 1895 to 1904. The building is devoted to the social interests of the university students. It contains study, reading, and lounging rooms, an assembly hall, the offices of Arcadia (student governing body), and of the college publications, the editorial and business office of the *Brown and White*, student semi-weekly newspaper, and club rooms for the dramatic and musical organizations, and faculty.

**Alumni Memorial Building**

The Alumni Memorial Building, which is used as the administration building of the University, was erected as a memorial to 1,921 Lehigh men who served in the World War, and especially to the forty-six who gave their lives. The cost of erection was raised by subscription from about 1,700 alumni. The Memorial Hall contains the records of the Lehigh men who served and those who died, together with mementos of the war.

In the south wing of the building are the offices of the president, the dean of undergraduates, the registrar, the director of admissions, the superintendent of buildings and grounds, and the director of placement. The north wing contains the offices of the treasurer, the bursar, the auditor, and the alumni association, the university supply bureau, and a large room used for faculty meetings and the meetings of the alumni association and of the alumni council.

**Taylor Gymnasium and Field House**

In 1913 Charles L. Taylor, E.M., '76, donated to the University the funds required for the erection of a gymnasium and field house.

Taylor Gymnasium adjoins the athletic field. The building is 222 feet long and 73 feet wide. On the ground floor is located the game room, 93 by 70 feet, used for basketball and wrestling. The game room is surrounded by a gallery for spectators. The main gymnasium floor measures 90 by 70 feet. Other rooms in Taylor Gymnasium are the offices of the director of athletics and physical education, staff offices and measuring room of the department of physical education, basketball and handball courts, fencing, boxing, and wrestling rooms, and locker rooms with accommodations for the entire student body.

The gymnasium is equipped with modern appliances for individual and class work in recreative and corrective exercises, calisthenics, and other gymnastics. Adjoining the locker rooms is a swimming pool, 75 by 25 feet, with a depth from  $4\frac{1}{2}$  to  $9\frac{1}{2}$  feet, and with a capacity of 95,000 gallons.

Adjoining the gymnasium and the stadium is the Taylor Field House. It is three stories in height, and has dressing rooms, lockers and shower baths for visiting and Lehigh teams. The third floor addition is known as the Samuel E. Berger Room and was built from funds given by Mr. Samuel Erwin Berger, B.A., '89.

#### Taylor Field

An athletic field of more than nine acres in area is provided for the accommodation of students who participate in the various outdoor sports. The stadium, located on the lower level, provides football and baseball fields, surrounded by concrete stands having a seating capacity of 12,000. On the upper level there is a practice field for football, baseball, lacrosse, and soccer; also a quarter-mile track and a 220-yard straight-away. During the winter months a wooden outdoor running track, twelve laps to the mile, is provided.

#### Lehigh Field and Field House

An additional athletic field of ten acres in area, with field house, gymnasium, and covered grandstand, is located about a mile from the university campus. The field house has dressing rooms, lockers, and shower baths; the gymnasium is equipped with basketball and volley ball courts. Here are eleven tennis courts for intercollegiate and intramural tennis. This field includes a playing ground for intercollegiate soccer and a field for intramural baseball and other intramural activities.

### Lamberton Hall

The first floor of this building contains the Main Dining Hall for Student use, a Private Dining Room together with a complete Kitchen and Cafeteria counter. The second floor contains a large Faculty Dining Room, pantry and Service Rooms. The basement contains Storerooms and Service Rooms for help.

A portion of the basement is used by the Military Department as a rifle range. This portion contains two indoor rifle and pistol ranges.

### The James Ward Packard Laboratory of Electrical and Mechanical Engineering

The late James Ward Packard, who was graduated from Lehigh University in 1884 with the degree of mechanical engineer, the designer of the first Packard motor car, the founder of the Packard Motor Car Company of Detroit, Michigan, and of the Packard Electric Company of Warren, Ohio, donated \$1,200,000.00 for the erection and equipment of an electrical and mechanical engineering laboratory.

The Packard Laboratory is a five-story steel-framed sandstone building 225 feet long and 180 feet wide. The lobby is finished in Italian travertine. The halls throughout the building are wainscoted with Tennessee marble. An auditorium on the first floor with a seating capacity of 622 is equipped with still- and talking-motion-picture apparatus.

The western half of the building is devoted to the work of the department of electrical engineering and contains the offices, class rooms, research rooms, and laboratories of the department. The main dynamo laboratory contains over a hundred generators and motors of various types. The high-tension laboratory is equipped with a 150 kv. and a 60 kv. testing transformer, a 700 kv. oscillation transformer, and a source of high d.c. voltage up to 100 kv. The transients laboratory is provided with six magnetic oscilloscopes, two cathode-ray oscilloscopes, two artificial transmission lines, a surge generator, and a photographic dark room. A five-unit harmonic phase-shifting motor generator set supplies voltages of various frequencies and wave forms for special tests. The communications laboratory has an extensive equipment of high-frequency measuring apparatus, vacuum-tube circuits, speech amplifiers, and a 40/80 meter transmitter (C.W. or phone) used by the radio club. The wiring system provides for a quick com-

munication and inter-connection between any two parts of the building. A portion of the basement is given to the installation of transforming machinery and switchboard for the laboratory power supply.

The eastern half of the building houses the department of mechanical engineering with offices, drawing rooms, class rooms, research rooms, reading and study room, photographic dark room, shop, instrument rooms, and laboratories. The general laboratory comprises a series of air compressors, steam engines, turbines, and pumps ranging from the simplest types to the ultra modern turbo-generator. Each unit is provided with the necessary auxiliaries for testing. The internal combustion laboratory contains a range of modern internal combustion engines: the simple gasoline engine, the semi-Diesel, ten automobile engines, an aeroplane engine, and two Diesel engines. All of these engines are arranged for connection to dynamometers, water brake, or prony brake such that determinations of efficiency and economy may be readily made. For the laboratory study of the principles of heating, ventilation, air conditioning, and refrigeration, there are available a fully equipped house heating unit and a refrigeration laboratory. The latter contains both an ammonia compressor and a CO<sub>2</sub> compressor which operated in series make possible a cold room temperature of fifty degrees below zero.

#### Sayre Park

A development of the mountain side of the university grounds was effected through the donation to the University in 1909 of the sum of \$100,000.00 by the children of the late Robert H. Sayre, to be used in the development of Sayre Park as a memorial to their father, who was a trustee of the University from its foundation in 1866 to his death in 1907.

#### The Arboretum

The Arboretum is a tract of about eleven acres adjoining Sayre Park. It was established by a friend of the University as a tree nursery for the purpose of furnishing illustrative specimens of American trees, and of cultivating trees and shrubs for the beautifying of the park. All of the more important species of North American trees are to be found in the university park and the arboretum. Adjoining the Arboretum a tract of seven acres has been planted with a variety of indigenous trees as an exhibition growth of tree culture.

## GENERAL REGULATIONS

### **Eligibility for Degree**

To be eligible for a degree from Lehigh University, a student must not only have completed all of the scholastic requirements for the degree, but he must have paid all university fees, and in addition all bills for the rental of rooms in the dormitories, or for damage to university property or equipment, or for any other indebtedness to the University; it being understood, however, that this regulation does not apply to any indebtedness for scholarship loans or for loans from trust funds administered by the University which are protected by properly executed notes approved by the treasurer.

### **Final Date for Completion of Requirements**

For graduation all requirements, scholastic and financial, must have been met by 12 o'clock noon on the Friday preceding the graduation exercises.

### **Notice of Candidacy for Degree**

Candidates for graduation on University Day file with the registrar on or before May 15 a written notice of candidacy for the degree, which notice shall bear the bursar's receipt for the required graduation fee of \$10.00; candidates for graduation on Founder's Day file a similar notice of candidacy on or before September 25; candidates for graduation at the Midyear Commencement file such notice on or before January 15. Failure to file such notice by the dates mentioned debars the candidate from receiving the degree at the ensuing graduation exercises. A candidate who pays his graduation fee and then fails to qualify for graduation will, on application, receive a refund of the fee.

### **Graduating Theses**

Undergraduate theses, when required, are accompanied by drawings and diagrams, whenever the subjects need such illustration. The originals are kept by the University, as a part of the student's record, for future reference, but copies may be retained by students, and may be published, permission having first been obtained from the faculty.

### Credit and Grades

Credit is reckoned in semester hours. A semester hour is a course unit involving a total of three clock hours of effort on the part of the student each week for a semester.

Final grades in courses are A, B, C, D, E, and F. A, B, C, and D are passing. The grade E entitles the student to a re-examination. F means a complete failure. Physical education is marked P or F without hour credit.

In cases of withdrawal from courses before the mid-semester reports the symbol W (withdrawn) is used to close the record; in cases of withdrawal after the mid-semester reports the symbols WP (withdrawn, passing) or WF (withdrawn, failing) are used.

The letters "Abs." (absent) are used to indicate absence from a final examination in a course. Such grades of "Abs." are reported with letter grades in parentheses, such letter grades representing the department's estimate of the student's work up to the close of instruction, with the provision that in cases where a department does not feel justified in reporting an estimated grade, a report of "Abs.(X)" will be returned.

The letters "Inc." are used to indicate that the work in a course is incomplete. The grade is accompanied by a letter grade. A student who incurs an "incomplete" in any course and fails to remove the "incomplete" within one calendar year, loses all equity in the course.

### HONORS

Honors are of three kinds: graduation honors, class honors, and special graduation honors.

#### Graduation Honors

Degrees "with honors" are awarded by vote of the faculty to those students who have attained an average of not less than 3.00 in their last two years' work at the University.

Degrees "with high honors" are awarded by vote of the faculty to those students who have attained an average of not less than 3.50 in their last two years' work at the University.

Degrees "with highest honors" are awarded by vote of the faculty to those students who have attained 3.75 in their last two years' work at the University.

Candidates for graduation who have been in residence at the University for less than two years are not eligible for graduation honors.

Graduation honors are announced at the graduation exercises.

In computing the averages of candidates for graduation honors, semester grades are weighted according to the number of credit hours in the course concerned on the basis: A equals 4, B equals 3, C equals 2, D equals 1, and F equals 0.

#### **Class Honors**

Upon the completion of the work of the freshman and sophomore years, on recommendation of the registrar and by vote of the faculty, class honors are awarded to those individuals who have made an average of 3.00 or better during the preceding year. The names of these students are announced at the graduation exercises at the end of each semester and published in the University Register.

#### **Special Honors**

Special honors are awarded at the end of the senior year, on recommendation of the head of the department concerned and by vote of the faculty, to students who have done advanced work of unusual merit in some chosen field. Candidates for special honors must indicate to the head of the department concerned and to the Registrar during the junior year their intention to work for such honors. Awards are based on grades obtained in the subject chosen, the results in extra work assigned, and the general proficiency of the candidate as evidenced either by a final examination or a thesis, as the head of the department involved may direct. Special honors are announced at the graduation exercises.

## **ACADEMIC OBSERVANCES**

### **University Sunday and University Day**

The baccalaureate services of University Sunday, the Sunday preceding University Day, were held on Sunday morning, June 18, 1944. The baccalaureate sermon was preached by Dr. Claude G. Beardslee, University Chaplain.

University Day, normally held on Monday, marks the close of the academic year. On this day the graduation exercises are held, an address is given, honors and prizes are announced, and degrees are conferred. In 1944, these exercises were held on Sunday afternoon, June 18. The address at the exercises was given by William Pearson Tolley, LL.D., Chancellor of Syracuse University.

#### **Founder's Day**

The first Wednesday in October each year is normally celebrated as Founder's Day in honor of the founder of the University, Asa Packer. Degrees are conferred and graduation honors and freshman and sophomore honors and prizes are announced. On account of the accelerated program of the University the celebration of Founder's Day was postponed in 1944 to the end of the Summer Semester.

Baccalaureate services were held on Sunday morning, October 15, 1944 and the sermon was preached by The Very Reverend Roscoe Thornton Foust, Dean and Rector of the Pro-Cathedral Church of the Nativity, Bethlehem, Pennsylvania.

Graduation exercises were held on the afternoon of the same day and the address was delivered by Fraser Metzger, D.D., L.H.D., Dean of Men, Rutgers University. Degrees were conferred and honors were announced.

#### **Midyear Commencement**

On Sunday, February 18, 1945, baccalaureate service and commencement exercises were combined. The baccalaureate sermon and commencement address was given by The Reverend Merrill Miles Moore, Rector, Trinity Episcopal Church, Bethlehem, Pennsylvania. Degrees were conferred and graduation and freshman and sophomore honors were announced.

### **LEHIGH INSTITUTE OF RESEARCH**

The Lehigh Institute of Research was organized in 1924 to encourage and promote scientific research and scholarly achievement in every division of learning represented in the organization of the University, and in recognition of the need for further and more exact knowledge in science and in the applications of science to the affairs of modern life.

The purposes of the Institute of Research include (1) the training of men for research work, (2) the publication of the results of investigations, (3) the conduct of general research, (4) the conduct of cooperative research, (5) the conduct of commercial tests and advisory service.

Detailed information concerning the organization and regulations of the Institute of Research are given in a pamphlet which will be furnished on request.

#### **RESEARCH FELLOWSHIPS**

Graduates in appropriate curricula of colleges, universities, and technical schools whose requirements for graduation are substantially the same as those at Lehigh University are eligible for appointment to the research fellowships listed below. Candidates for fellowships must make application on blanks which will be provided by the University on request. Requests for the blanks should be addressed to the dean of the Graduate School, Lehigh University, Bethlehem, Pa. Applications must be filed on or before March 1. Each application must be accompanied by a certificate of the candidate's college work, a statement concerning his practical experience, and any other evidence of his qualifications which he may choose to submit. An applicant must indicate the line of graduate study he desires to undertake and his special qualifications for such work.

A holder of a fellowship may not accept any employment for pay without the written permission of the dean of the Graduate School.

Holders of fellowships, who also pursue graduate work at the University, are exempt from the payment of the university tuition fee.

##### **New Jersey Zinc Company Research Fellowship**

The New Jersey Zinc Company provided funds in 1924 for a research fellowship to be known as the New Jersey Zinc Company Research Fellowship.

Appointment to this fellowship is for the period of two academic years, beginning September 1 and ending June 30, with an annual stipend of \$600.00 payable in ten installments. Half of the time of the holder of this fellowship must be devoted to re-

search work in the department to which he is assigned; the other half to graduate study leading to a master's degree at the end of the two-year appointment, provided all university requirements for this degree have been satisfied. The holder of this fellowship is required to devote approximately ninety hours a month, exclusive of university holidays, to research work assigned to him in the department to which he is attached.

**The Henry Marison Byllesby Memorial Research Fellowships**

In 1926 Mrs. H. M. Byllesby, widow of Col. H. M. Byllesby, M.E., '78, President of the Byllesby Engineering and Management Corporation, provided an endowment fund for the establishment of the Henry Marison Byllesby Memorial Research Fellowship in Engineering.

Appointment to these fellowships are for two academic years with an annual stipend of \$750.00 payable in ten instalments. Half of the time of the holders of these fellowships must be devoted to research work on some problem in electrical, mechanical, or hydraulic engineering, proposed by the President of the Byllesby Engineering and Management Corporation and approved by the Lehigh Institute of Research; the other half to graduate study leading to the degree of Master of Science at the end of the two-year appointment, provided all university requirements for this degree have been satisfied.

**The James Ward Packard Research Fellowships in Electrical or Mechanical Engineering**

The income from a bequest from James Ward Packard, M.E., '84, provides for a research fellowship in either electrical or mechanical engineering. Appointment to this fellowship is for a period of two academic years, with an annual stipend of \$600.00.

**The C. Kemble Baldwin Research Fellowships in Aeronautics**

A fund provided by Mrs. C. Kemble Baldwin as a memorial to her husband, C. Kemble Baldwin, M.E., '95, provides for the occasional appointment of a research fellow in any branch of science having a bearing on the field of aeronautics. Appointment to this fellowship is for a period of two academic years, with an annual stipend of \$750.00.

**The Lawrence Calvin Brink Research Fellowship  
in Civil Engineering**

A fund provided by the late Mrs. L. C. Brink as a memorial to her husband, Lawrence Calvin Brink, C.E., '94, provides for the occasional appointment of a research fellow in civil engineering. Appointment to this fellowship is for a period of two academic years, with an annual stipend of \$600.00.

**The Student Chemistry Foundation Fellowships**

In the spring of 1927, members of the class of 1930 established the Student Chemistry Foundation in honor of Harry M. Ullmann, then head of the department of chemistry. Subsequent classes have contributed to the fund. This fund provides two research fellowships, for which Lehigh University graduates only are eligible. Appointments to these fellowships are for a period of two academic years, with an annual stipend of \$600.00.

**The Garrett Linderman Hoppes Research Fellowship  
in Civil Engineering**

A research fellowship in civil engineering was established by the late Mrs. Maria B. Hoppes in memory of her son, the late Garrett Linderman Hoppes, C.E., '83. Appointment to this fellowship is for a period of two academic years, with an annual stipend of \$600.00.

**The William L. Heim Research Fellowship in Chemistry**

A research fellowship in chemistry was established by William L. Heim, B.S., in Chem. '02. Appointment to this fellowship is for a period of two academic years, with an annual stipend of \$600.00. The research at present is in the field of X-ray analysis.

**The Roy R. Hornor Research Fellowship in Metallurgy  
and Inorganic Chemistry**

The income from a bequest by Roy R. Hornor, B.S., '99, provides for a research fellowship in either metallurgy or inorganic chemistry. The appointment is for two years with an annual stipend of \$600.00. The holder of this fellowship will devote half-time to research under the direction of the faculty, and half-time to graduate study. While the appointment will generally be made alternately between the metallurgy department and the chemistry department, it may be determined by the qualifications of available candidates.

**The Katharine Comstock Thorne Fellowship in Biology**

The late Gordon Comstock Thorne of the class of 1916 endowed the Katharine Comstock Thorne Fellowship in Biology in memory of his mother. The appointment is for two years at a stipend of \$500.00 annually and free tuition. The appointee will devote half his time to research in the department and half his time to graduate study.

A research fellowship in metallurgy was established by John H. Frye, Sr. Appointment to this fellowship is for a period of two academic years, with an annual stipend of \$600. The research at present is in the field of physical metallurgy.

**Industrial Research Fellowships**

Lehigh University cooperates with industrial concerns in offering fellowships for the study of research problems along specialized lines. The following industrial research fellowships have been established.

**THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION RESEARCH FELLOWSHIPS** for research in steel construction. Two fellowships with an annual stipend of \$600.00.

**THE AMERICAN BUREAU OF WELDING RESEARCH FELLOWSHIP** for research in electric welding. One fellowship with an annual stipend of \$600.00.

**SETON LEATHER COMPANY FELLOWSHIP** for research in leather technology. One fellowship with an annual stipend of \$720.00.

**RAYBESTOS-MANHATTAN COMPANY FELLOWSHIPS** for research in asbestos products and brake linings. Two fellowships with an annual stipend of \$720.00.

**THE DEVOE AND RAYNOLDS COMPANY RESEARCH FELLOWSHIP** for research in the field of colloid chemistry. One fellowship with an annual stipend of \$600.00.

**NATIONAL OIL PRODUCTS COMPANY FELLOWSHIPS** for research in textile oils. Two fellowships with an annual stipend of \$600.00.

**MUTUAL CHEMICAL COMPANY OF AMERICA FELLOWSHIP** for research in chromium compounds. One fellowship with an annual stipend of \$600.00.

CORN PRODUCTS REFINING COMPANY RESEARCH FELLOWSHIP IN LEATHER TECHNOLOGY. One fellowship with an annual stipend of \$600.00.

**ENDOWMENT OF FELLOWSHIPS**

Research fellowships named in honor of an individual or a corporation offering opportunities for graduate work and training in research in any designated field of study may be established in perpetuity through the payment to the board of trustees of \$20,000.00. The income from this fund will be paid to the holder of the fellowship after the deduction of his tuition and laboratory fees. If a bequest for the establishment of a fellowship provides for half-time service as a research assistant in the Institute of Research, the remaining time to be devoted to graduate study, the University will remit the tuition fee and make only such charges against the fund as are necessary to cover the cost of materials, supplies, and apparatus that need to be provided for the work of the fellow.

## DEGREES

### DEGREES CONFERRED ON UNIVERSITY DAY, JUNE 18, 1944

#### Honorary Degrees

##### DOCTOR OF ENGINEERING

Martin Withington Clement  
President, Pennsylvania Railroad

Earle Frederick Johnson  
Vice-President, General Motors Corporation

##### DOCTOR OF HUMANE LETTERS

Kenneth Frazier  
Associate, National Academy. Trustee, Brooklyn Museum

##### DOCTOR OF LETTERS

William Andrew Paton  
Professor, economics and accounting—University of Michigan

#### Degrees in Course

##### DOCTOR OF PHILOSOPHY

Major in Chemistry

Richard Noble Rhoda, B.S., M.S., (*University of Pittsburgh, Lehigh University*)

##### PROFESSIONAL DEGREE

Metallurgical Engineer

Henry James Forsyth, B.S. in Met.E. (*Lehigh University*)

##### MASTER OF ARTS

Major in Education

Miriam Lathea Boyer, B.S. (*Ithaca College*)

Reuben Walter Bunger, Ph.B. (*Muhlenberg College*)

Harold Francis Shunk, B.S. (*Lafayette College*)

Major in Psychology

Clarence Henry Moatz, A.B., B.D. (*Moravian College, Theological Seminary of the Reformed Church*)

Major in Spanish

Helen Jane Marcks, Ph.B. (*Muhlenberg College*)

##### MASTER OF SCIENCE

Major in Chemistry

Ralph Wagner Bentz, B.S. (*Albright College*)

Willis Amos Heisey, B.S. (*Albright College*)

Margaret Miriam Lams, B.S. (*Pennsylvania State College*)

Preston Parr, B.S. in Ch.E. (*Lehigh University*)

William Comstock Walker, B.S. in Ch.E. (*Lehigh University*)

DEGREES

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Major in Mechanical Engineering  
Lee Terrell Askren, B.S. in M.E. (*Purdue University*)

BACHELOR OF ARTS

Robert Otto Jensen	David Harrison Welsh
Richard Maxwell Leiter	Richard Rhys Williams
Louis Moosbrugger Richards	

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

Richard Henry Leeds	Stephen Bowne McElroy
Myron A. Lerner	Michael James Pappas

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Carl Paul Bauer	Herbert George Lauterbach
Richard Henry Boll	Edwin Philipp Marx
Richard Albert Friend	David Francis Wells

BACHELOR OF SCIENCE IN CHEMISTRY

Jay Richard Lee

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Richard Dannecker Horlacher	Gerald Edward Walsh, Jr.
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BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Arnold Samuel Epstein	Stanley Walter Odrzywolski
Frank Avery Hill	Georges Richard Potter
Ralph Rupp Lau	Frank Butler Roberts

BACHELOR OF SCIENCE IN ENGINEERING PHYSICS

Ira Brahm Born	Ralph Aiken Evans
Aldo Nicholas Ciaffardini	

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

Jacob Milton Ettinger	Claude Orison Messinger
David Leslie Keese	

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Robert Williamson Cawley	John Franklin Mengel
Donald Nathaniel Curtiss	Marcy Lee Morrison
George Henry Kocyan, Jr.	James Francis Wilson
Norman Julian Lindner	

BACHELOR OF SCIENCE IN METALLURGICAL ENGINEERING

Alfred Copeland Callen, Jr.	Robert Stanley Miltenberger
Victor Pablo Cordero, Ch.E. ( <i>School of Engineers of Peru</i> )	Paul Leslie Reiber, Jr.
Edmund Crawford Fetter	Leland Stanford Willis, Jr.

DEGREES CONFERRED ON FOUNDER'S DAY,  
OCTOBER 15, 1944

Honorary Degree

Bradley Stoughton

Professor Emeritus of Metallurgical Engineering, Lehigh University

Degrees in Course

DOCTOR OF PHILOSOPHY

Major in Chemistry

Clifton Rems Neumoyer, B.S. in Ch.E., M.S. (*Lehigh University*)

Major in Mechanical Engineering

Bela Kalman Erdoss, Dipl.Ing., M.S. (*Royal Joseph University of Engineering, Lehigh University*)

Major in Metallurgy

Robert Daniel Stout, B.S., M.S. (*Pennsylvania State College, Lehigh University*)

Yu-Lin Yao, B.S. in Ch.E., M.Eng. (*National Chekiang University, McGill University*)

MASTER OF ARTS

Major in Education

Paul Jacob Fink, B.A., M.A. (*Ohio State University*)

Paul Arthur Nagle, B.S. (*Muhlenberg College*)

Zena Andrea Platoff, B.S. (*Drexel Institute*)

Herbert John Schlenker, B.S. (*Albright College*)

Major in Mathematics

Christian Charles Miesse, B.A. (*Albright College*)

MASTER OF SCIENCE

Major in Chemistry

Edward Adam Fehnel, B.S. in Chem. (*Lehigh University*)

Helen Sydney Zable, B.S. (*Pennsylvania State College*)

Major in Metallurgical Engineering

Joaquin Antonio Prieto Isaza, B.S. in Chem. (*Universidad Nacional de Colombia*)

BACHELOR OF ARTS

Robert Joseph Gill

Joseph Hooker Myers

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

Anthony Constantine Fortosis Donald Walter Schmoyer

Paul Justus Franz, Jr.

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Fred Jones Attaway, Jr.

Luther Daniel Loch

Francis Thomas Carr

Walter Edward Margie, Jr.

Michael John Gluck

Fritz von Bergen

Clarence Monroe Harriger, Jr.

Donald Bryce Walters

David Clark Kirk, Jr.

Thomas Robert Winco

DEGREES

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BACHELOR OF SCIENCE IN CHEMISTRY

Lee Alfred Greenbaum, Jr. Raffaele Francesco Muraca

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Ernest George Abell Edgar Allen Frankley  
George Nestor DeCowsky

BACHELOR OF SCIENCE IN ENGINEERING PHYSICS

Philip Schuyler Rust

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Paul Chapman Andrews Herman George Peter Snyder  
Albert Slocomb Perley

BACHELOR OF SCIENCE IN METALLURGICAL ENGINEERING

John Richard Bevan George Charles Wheeler, Jr.

BACHELOR OF SCIENCE IN MINING ENGINEERING

Frederick William Bloecher, Jr. Daniel Center Shewmon  
James Eagen Golden

DEGREES CONFERRED ON MIDYEAR COMMENCEMENT  
DAY, FEBRUARY 18, 1945

Degrees in Course

MASTER OF ARTS

Major in Education

Camille Reuben Weidner, B.S. (*Muhlenberg College*)

MASTER OF SCIENCE

Major in Bacteriology

Anne Marie Peters, A.B. (*College of New Rochelle*)

Major in Biology

Michael Philip Hunter, B.S. (*Pennsylvania State College*)

Major in Chemistry

Robert Roland Ressler, B.S. in Chem. (*Lehigh University*)

Major in Electrical Engineering

Lawrence Joseph Heine, E.E. (*Lehigh University*)

Major in Physics

Kurt Heinz Weber, B.S. in Eng.Phys. (*Lehigh University*)

LEHIGH UNIVERSITY

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BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

Francis Louis Majczan Donald Alton Marcks

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Victor Warren Fox Martin Jerome Kaplan

BACHELOR OF SCIENCE IN CHEMISTRY

Richard Mitman Ruthhart

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Frank Eberly Strehle John Parker Troy

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

William Robert Moore

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Martin Werner Grossman, Jr.

HONORS

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## HONORS

**HONORS ANNOUNCED ON UNIVERSITY DAY,  
JUNE 18, 1944**

### Graduation Honors

#### GRADUATED WITH HIGHEST HONORS

Richard Rhys Williams

#### GRADUATED WITH HIGH HONORS

Ira Brahm Born  
Ralph Aiken Evans

Herbert George Lauterbach  
Robert Stanley Miltenberger

#### GRADUATED WITH HONORS

Richard Henry Boll  
Arnold Samuel Epstein  
Richard Dannecker Horlacher  
Jay Richard Lee  
Norman Julian Lindner

Stephen Bowne McElroy  
Michael James Pappas  
Louis Moosbrugger Richards  
Frank Butler Roberts

#### GRADUATED WITH SPECIAL HONORS

##### Greek

Richard Rhys Williams

##### Mathematics

Ralph Aiken Evans

### Freshman and Sophomore Honors

(Awarded to those members of the freshman and sophomore classes who made an average grade of 3.00 or higher)

#### FRESHMAN HONORS

(Freshman year of work completed at the close of the Summer Semester, 1943)

Howard Moore Prentzel      Robert Daniel Wallick

(Freshman year of work completed at the close of the Fall Semester, 1943-44)

John Furley Baum	Robert Hani Korkegi
John Millar Carroll	Edward Cooper Luckenbach
Nathan Cohen	Clarence Sharp Lyon
Richard Axtell Craig	Claude Walter Nash
Richard Snyder DeTurk	Robert Eugene Sentz
Howard Irwin Ellowitz	Don Landis Shettel
John Charles Gebhart	David Emanuel Simon II
Richard Frank Greene	Richard Thomas Smith
Walter Scott Johns III	Robert Kenneth Stoltz, Jr.
Frederick William Kocher	Carl Sanford Teets, Jr.

LEHIGH UNIVERSITY

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(Freshman year of work completed at the close of the Spring Semester,  
1943-44)

Albert Bowman Cristy	Eugene Pozebanchuk
Richard Caldwell Huyett	Sherman Grossman Sass
Richard Joseph MacAdams	Elwood Franklin Seasholtz

SOPHOMORE HONORS

(Sophomore year of work completed at the close of the Fall Semester,  
1943-44)

Maurice Bick	William Frederick Reehl
Robert Bartlett Curtis	Joseph Stephen Rengert
Victor Warren Fox	Donald Frey Ressler
Carl Wilhelm Helstrom	Robert Benjamin Rosener
Frank H. Marsh, Jr.	Norman Castor Sidebotham
Robert Walter Mayer	Max Harvey Stettner
Rowland Barton Miles	George Harold Wagner
Edwin Thomas Pieski	Roy Clemson Ward
Seemon Hayden Pines	Daniel Marvin Zane

(Sophomore year of work completed at the close of the Spring Semester,  
1943-44)

Robert Daniel Wallick

HONORS ANNOUNCED ON FOUNDER'S DAY,

OCTOBER 15, 1944

Graduation Honors

GRADUATED WITH HIGH HONORS

Paul Justus Franz, Jr.

GRADUATED WITH HONORS

Paul Chapman Andrews	Joseph Hooker Myers
Frederick William Bloecher, Jr.	Albert Slocomb Perley
Anthony Constantine Fortosis	

Freshman and Sophomore Honors

(Awarded to those members of the freshman and sophomore classes who  
made an average grade of 3.00 or higher)

FRESHMAN HONORS

(Freshman year of work completed at the close of the Summer Semester,  
1944)

William Dashifsky	Robert Ernst Schulz
Robert Jay Landy	Marvin Seymour Weinreb

SOPHOMORE HONORS

(Sophomore year of work completed at the close of the Summer Semester,  
1944)

Richard Axtell Craig	David Emanuel Simon II
Ralph Schultz Gruber	Richard Thomas Smith
Richard Frank Greene	

## HONORS

**HONORS ANNOUNCED ON MIDYEAR COMMENCEMENT  
DAY, FEBRUARY 18, 1945**

## **Graduation Honors**

## GRADUATED WITH HONORS

Victor Warren Fox

### **Freshman and Sophomore Honors**

(Awarded to those members of the freshman and sophomore classes who made an average grade of 3.00 or higher)

## FRESHMAN HONORS

(Freshman year of work completed at the close of the Fall Semester,  
1944-45)

Leo Alexander Achterman, Jr.  
George Irwin Adler  
Valentino John Assetto  
Alvord Miner Beardslee  
George Herbert Bingham, Jr.  
Richard Phillips Bodine  
Alvin Henry Fisher, Jr.  
David James Herder  
Gilpin Hazard Jefferis, Jr.  
Ronald Henry Jeffery  
Richard Herckman Jones  
Robert Edwin Mertz  
Frank Ralston Roberts  
Nathan Schloss  
Richard Stinson Stemler  
Frederick Doster Stocker  
Kenneth William Theile  
Carl Francis Zimmerer

## SOPHOMORE HONORS

(Sophomore year of work completed at the close of the Fall Semester,  
1944-45)

Richard Caldwell Huyett Sherman Grossman Sass

## PRIZES

### PRIZES ANNOUNCED ON UNIVERSITY DAY, JUNE 18, 1944

#### HAROLD J. HORN PRIZES IN ELECTRICAL ENGINEERING PROSEMINAR

First Prize, \$10  
Frank Butler Roberts

Second Prize, \$5  
Max William Bellis

#### JOHN B. CARSON PRIZE, \$50—for the best record in professional courses in civil engineering

Richard Dannecker Horlacher

#### PHILLIP FRANCIS DUPONT MEMORIAL PRIZES IN ELECTRICAL ENGINEERING—for the top ranking seniors

First Prize, \$70  
Arnold Stanley Epstein

Second Prize, \$35  
Frank Butler Roberts

#### WILLIAMS SENIOR PRIZE IN HISTORY

First Prize, \$75  
Philip James Gahagan

#### WILLIAMS SENIOR PRIZE IN PHILOSOPHY

First Prize, \$75  
Richard Rhys Williams

#### WILLIAM H. CHANDLER CHEMISTRY PRIZES—to the highest ranking student in each class in chemistry and chemical engineering

Senior Year, \$25  
Theodore Peters, Jr.

Junior Year, \$25  
Alan Chichester Abeel, Jr.

Sophomore Year, \$25  
Victor Warren Fox

Freshman Year, \$25  
John Charles Gebhard, Jr.

#### ALUMNI JUNIOR PRIZES—to the highest ranking juniors in each of the three Colleges of the University

Arts and Science, \$25  
Richard Rhys Williams

Business Administration, \$25  
Paul Justus Franz, Jr.

P R I Z E S

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Engineering, one prize, \$25  
Louis Martin Domeratzky

Engineering, one prize, \$25  
Alan Chichester Abeel, Jr.

WILLIAMS JUNIOR PRIZE IN ENGLISH COMPOSITION

First Prize, \$50  
Jay Richard Lee

WILBUR SCHOLARSHIP, \$200—to the highest ranking sophomore  
Carl Wilhelm Helstrom

ELECTRICAL ENGINEERING PRIZE, \$15—to the highest ranking sophomore  
in electrical engineering  
Robert Daniel Wallick

JOHN R. WAGNER AWARD, \$15—to the highest ranking student in  
mechanical engineering during his first two years  
Frank H. Marsh, Jr.

WILBUR PRIZES, SOPHOMORE YEAR

Mathematics, \$10  
Carl Wilhelm Helstrom

Physics, \$10  
Carl Wilhelm Helstrom

WILBUR PRIZES, FRESHMAN YEAR

Mathematics  
First Prize, \$15  
Elwood Franklin Seasholtz

Second Prize, \$10  
Richard Axtell Craig

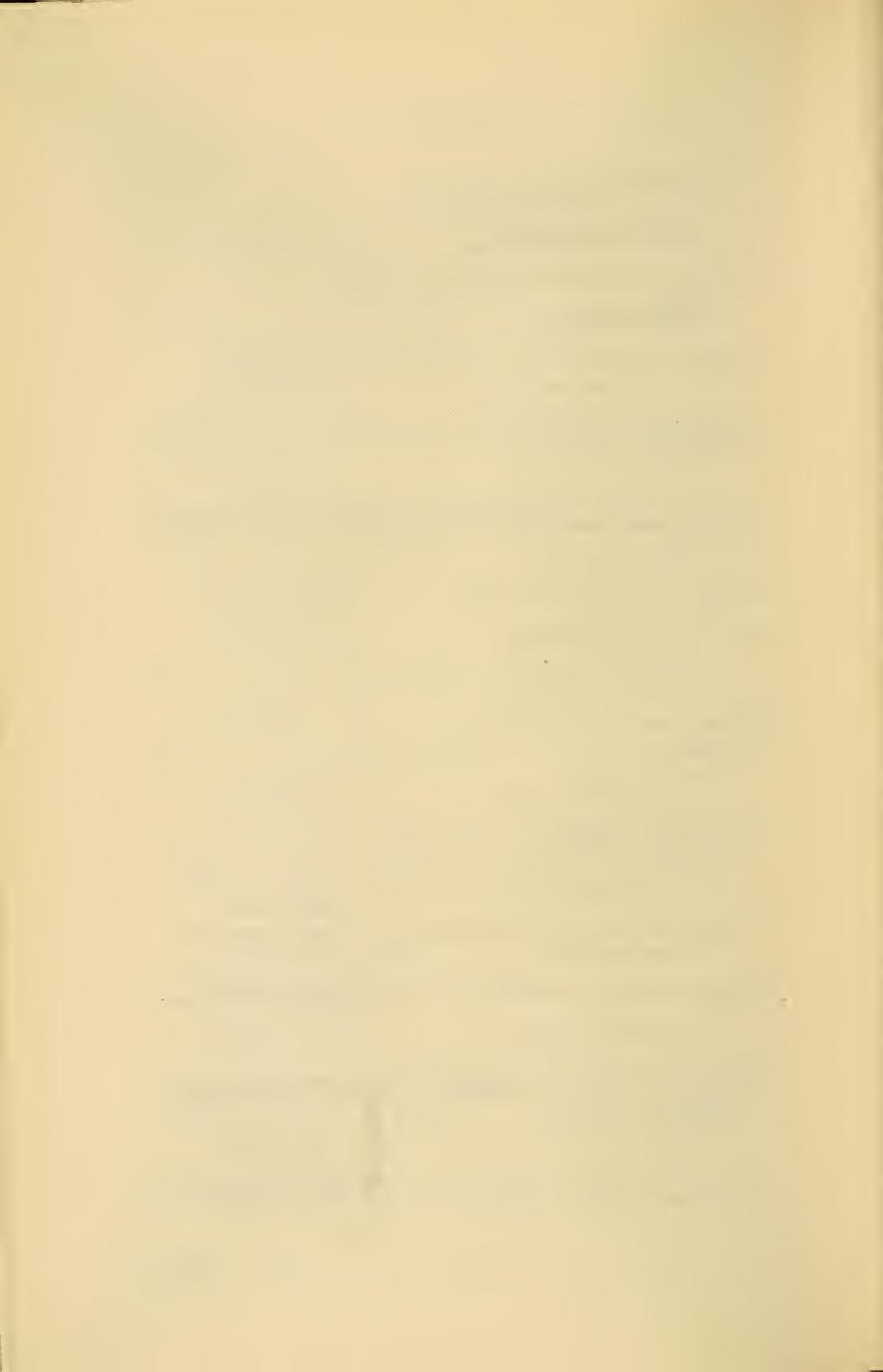
English, \$15  
Sherman Grossman Sass

AMERICAN SOCIETY OF CIVIL ENGINEERS JUNIOR MEMBERSHIP PRIZE  
Robert Louis Smith

AMERICAN SOCIETY OF MECHANICAL ENGINEERS JUNIOR MEMBERSHIP  
PRIZE  
John Franklin Mengel

Pi TAU SIGMA INDUSTRIAL AND MECHANICAL ENGINEERING PRIZE (En-  
gineer's Handbook)—to the highest ranking freshman in industrial or  
mechanical engineering  
John Furley Baum

TAU BETA PI PRIZE, \$10—to the highest ranking freshman in engineering  
Elwood Franklin Seasholtz



**Register of Students  
1944 - 1945**



## STUDENTS 1944-45

### GRADUATE STUDENTS, SUMMER SEMESTER, 1944, FALL AND SPRING SEMESTER, 1944-45

In the following list of graduate students, an entry such as "Major: Chemistry" signifies that the student has been admitted to candidacy for the master's degree with a major in the field indicated. An entry such as "Major\*: Chemistry" signifies that the student has been admitted to candidacy for the doctor's degree in the field indicated.

Ackley, Jean A. P. B.S. in Ed. ( <i>Temple University</i> ).	Allentown
Adams, Anne Wysoka B.S. ( <i>Muhlenberg College</i> ). Major. Education.	Bethlehem
Adams, Betty Louise B.A. ( <i>Moravian College for Women</i> ). Major: English.	Bethlehem
Andrew, Ernestine Louisa B.S. in Ed. ( <i>East Stroudsburg State Teachers College</i> ). Major: Education.	Stroudsburg
Bachman, Charles Frederick Ph.B. ( <i>Muhlenberg College</i> ). Major: Education.	Allentown
Barthold, Harold Joseph A.B. ( <i>Muhlenberg College</i> ). Major: Education.	Bethlehem
Bealer, Carolyn Maude B.A. ( <i>Moravian College for Women</i> ). Major: English.	Bethlehem
Becker, Barbara Alice A.B. ( <i>Allegheny College</i> ). Major: History.	Bethlehem
Bennick, Hugh Richard B.A. ( <i>Moravian College</i> )	Bethlehem
Bobbe, Richard Arthur B.S. in I.E. ( <i>Lehigh University</i> )	Bethlehem
Borman, Ruth L. B.S. ( <i>East Stroudsburg State Teachers College</i> )	Roslyn
Brader, Henry Milton B.S. ( <i>Muhlenberg College</i> ). Major: Education.	Allentown
Brader, Pearl Matilda A.B. ( <i>Muhlenberg College</i> )	Allentown
Brown, Earl Haines B.S., M.A. ( <i>Pennsylvania State College, Lehigh University</i> )	Slatington
Brown, Ralph C. Ph.B. ( <i>Muhlenberg College</i> ). Major: Education.	Catasauqua
Carling, William Frank B.S. ( <i>Muhlenberg College</i> ). Major. Chemistry. Raybestos-Manhattan Company Research Fellow	Easton
Cassone, Olympia Kathryn A.B. ( <i>Cedar Crest College</i> ). Major: Education.	Allentown

LEHIGH UNIVERSITY

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Cobley, Herbert Franklin B.S. ( <i>Kutztown State Teachers College</i> ).	West Reading
Colver, Harry James, Jr. B.A., B.D. ( <i>Catawba College, Lancaster Theological Seminary</i> ) Major: History.	Bethlehem
Cump, Guy B.S. ( <i>Gettysburg College</i> ).	Nazareth
Daney, Walter Francis Ph.B., M.A. ( <i>Muhlenberg College, Lehigh University</i> ). Major: Education.	Bethlehem
Davies, Claudine Deshler B.S. ( <i>Kutztown State Teachers College</i> ).	Fullerton
Davies, Thomas L. B.S. ( <i>Kutztown State Teachers College</i> ). Major: Education.	Fullerton
Delich, John Paul B.A. ( <i>Lehigh University</i> ).	Palmerton
Dodd, Gilbert Blake B.S. ( <i>East Stroudsburg State Teachers College</i> ). Major: Education.	Bethlehem
Downey, Robert Charles B.S. ( <i>Rockhurst College</i> ). Major: Metallurgy.	Kansas City, Mo.
Duke, Evelyn B.S. ( <i>West Chester State Teachers College</i> ).	Easton
Earley, Miriam Lucy B.S. in Ed. ( <i>Muhlenberg College</i> ).	Bethlehem
Eichel, Ethlyn Lillian B.S. ( <i>Teachers College—Columbia University</i> ). Major: Education.	Allentown
Farne, Doris Aline B.S. in Ed. ( <i>West Chester State Teachers College</i> )	Allentown
Farr, James Albert, Jr. B.S. ( <i>Albright College</i> ). Major: Chemistry. Research Fellow in Chemistry.	Tamaqua
Fehnel, Edward Adam B.S. in Chem. ( <i>Lehigh University</i> ). Major: Chemistry.	Bethlehem
Fink, Joseph Michael B.S. ( <i>William and Mary College</i> ). Major: History.	Ferndale
Fisher, Robert Lamar B.S. ( <i>Kutztown State Teachers College</i> ). Major: Education.	Reading
Fister, Samuel Nicholas B.S. ( <i>Pennsylvania State College</i> ).	Reading
Fox, Victor Warren B.S. in Ch.E. ( <i>Lehigh University</i> ). Major: Chemical Engineering. National Lead Company Research Fellow in Chemistry.	Asbury Park, N. J.
Frantz, George Edwin B.S. ( <i>Kutztown State Teachers College</i> ). Major: Education.	Allentown

S T U D E N T S

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Franz, Paul Justus, Jr.	Elkins Park
B.S. in Bus. Adm. ( <i>Lehigh University</i> ). Major: History and Government.	
Assistant to the Director of Admissions.	
Frey, Esther Cheradine	Allentown
B.S. ( <i>Kutztown State Teachers College</i> ). Major: Education.	
Fuat, Dundar	Ankara, Turkey
Diploma-Vorprüfung ( <i>Bergakademie Freiberg</i> ). Major: Education.	
Gall, Helen	Easton
B.S. ( <i>Muhlenberg College</i> ). Major: Education.	
Gilbert, Harry Irman	Boyertown
A.B., M.Ed. ( <i>Pennsylvania State College, University of Pittsburgh</i> ).	
Gledhill, Richard Edwin	Allentown
B.S., M. of Ed. ( <i>Kutztown State Teachers College, Temple University</i> ).	
Goodman, Ellen	Bethlehem
B.A. ( <i>Moravian College for Women</i> ).	
Goulding, Paul Welling	Nazareth
B.S., M.S. ( <i>West Chester State Teachers College, University of Pennsylvania</i> ). Major: History.	
Hantzes, Harry Nicholas	Mount Carmel
B.S. ( <i>Albright College</i> ). Major: Chemistry.	
Research Fellow in Chemistry.	
Harding, Thelma Catherine	Bath
B.S. ( <i>University of Pennsylvania</i> ). Major: Education.	
Harrison, Doris A.	Palmerton
A.B. ( <i>Ohio University</i> ). Major: History.	
Hartman, Earl John	Slatington
B.A., M.A. ( <i>Bucknell University, Lehigh University</i> ).	
Hartman, Elizabeth Regina	Bethlehem
B.A., B.S. in L.S. ( <i>Moravian College for Women, Drexel Institute</i> ). Major: English.	
Assistant Circulation Librarian, Lehigh University Library.	
Heine, Lawrence Joseph	Bethlehem
E.E. ( <i>Lehigh University</i> ). Major: Electrical Engineering.	
Held, Paul Franklin	Allentown
Ph.B. ( <i>Muhlenberg College</i> ). Major: Education.	
Hertz, John Atler	Bethlehem
A.B. ( <i>Moravian College</i> ). Major: English.	
Houston, George William	Port Washington, N. Y.
B.S. in Ch.E. ( <i>Lehigh University</i> ). Major: Chemistry.	
National Lead Company Research Fellow in Chemistry.	
Johnson, William Dexter	Minneapolis, Minn.
B.A. ( <i>University of Minnesota</i> ). Major: Chemistry.	
Mutual Chemical Company Research Fellow	

LEHIGH UNIVERSITY

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Keck, Winfield	Allentown
B.A., M.A. ( <i>Amherst College, University of Pennsylvania</i> ).	
Kelchner, Mabell	Bethlehem
B.S. ( <i>Albright College</i> ). Major: Education.	
Keleher, John Joseph	Bethlehem
Ph.B. ( <i>Muhlenberg College</i> ).	
Kemmerle, Jean Leah	Bethlehem
B.A. ( <i>Moravian College for Women</i> ). Major: English.	
Kleckner, Evelyn Clare	Allentown
B.S. ( <i>Kutztown State Teachers College</i> ).	
Kline, Harold Robert	Bethlehem
A.B. ( <i>Muhlenberg College</i> ).	
Kleppinger, Carl Theodore	Allentown
B.S. in Chem. ( <i>Lehigh University</i> ). Major: Chemistry. Research Assistant in Chemistry.	
Kramer, Leonard John	Bethlehem
B.A. ( <i>Moravian College</i> ).	
Krauss, Mildred Charlotte	Centre Valley
B.S. ( <i>West Chester State Teachers College</i> ). Major: Education.	
LaMonica, Anna	Phillipsburg, N. J.
B.S. ( <i>Cedar Crest College</i> ). Major: Education.	
Levine, William Sirius	Bethlehem
B.A., M.A., ( <i>Ohio State University</i> ). Major*: Chemistry.	
Maish, George Orville	Bethlehem
B.S. ( <i>Pennsylvania State College</i> ).	
Mancke, Edgar Bell	Bethlehem
B.S. in Ch.E. ( <i>Lehigh University</i> ).	
Marquardt, Jeanne Barbara	Allentown
B.S. in Ed. ( <i>Kutztown State Teachers College</i> ).	
McGeady, Leon Joseph	Freemansburg
B.S. in Met.E. ( <i>Lehigh University</i> ). Major: Metallurgy.	
McLernon, Joseph Francis	Bethlehem
B.S. ( <i>Moravian College</i> ). Major: Education.	
Meshel, Rose	Bethlehem
B.S. ( <i>Muhlenberg College</i> ).	
Miller, Adele Mae	Allentown
B.S. ( <i>Columbia University</i> ). Major: Education.	
Montenegro, Pedro Valmir	Brazil
B.S. ( <i>University of Alabama</i> ). Major: Chemistry. National Oil Products Company Research Fellow	
Moser, Paul Alfred	Allentown
B.A. ( <i>Lehigh University</i> ). Major: Mathematics.	
Moser, William Gustave	Hatboro
A.B. ( <i>Muhlenberg College</i> ). Major: Education.	

S T U D E N T S

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Muraca, Raffaele Francesco	Easton
B.S. in Chem. ( <i>Lehigh University</i> ). Major: Chemistry.	
Musso, Gino Joseph	Slatington
B.S. ( <i>Kutztown State Teachers College</i> ). Major: History.	
Myers, Richmond E.	Emmaus
A.B., M.A. ( <i>Moravian College, University of Pennsylvania</i> ). Major*: Geology.	
Nicholson, Bruce Jesmond	Bethlehem
M.E. ( <i>Cornell University</i> ). Major: Mining Engineering.	
Odrzywolski, Stanley Walter	Buffalo, N. Y.
B.S. in E.E. ( <i>Lehigh University</i> ).	
Parsons, William Alexander	Kingston
A.B., Th.B. ( <i>Pennsylvania State College, Princeton Theological Seminary</i> ). Major: English.	
Peters, Anne Marie	Bethlehem
A.B. ( <i>College of New Rochelle</i> ). Major: Bacteriology.	
Katharine Comstock Thorne Fellow.	
Podgursky, John Michael	Bethlehem
B.S. in Ch.E. ( <i>Lehigh University</i> ). Major: Chemistry.	
Poinsard, Elwyn Emile	East Stroudsburg
B.S. ( <i>East Stroudsburg State Teachers College</i> ). Major: Education.	
Preletz, Joseph Bernard	Bethlehem
Litt.B. ( <i>Rutgers University</i> ). Major: Education.	
Prieto Isaza, Joaquin Antonio	Bogota, Columbia, S. A.
B.S. in Chem. ( <i>National University of Columbia</i> ). Major: Metallurgical Engineering.	
Rea, Kathleen	Bethlehem
B.A. ( <i>New Jersey College for Women</i> ). Major: English.	
Redline, Marion Elizabeth	Bethlehem
B.S. ( <i>Cedar Crest College</i> ).	
Reiber, Paul Leslie, Jr.	Bethlehem
B.S. in Met.E. ( <i>Lehigh University</i> ).	
Ressler, Robert Roland	Allentown
B.S. in Chem. ( <i>Lehigh University</i> ). Major: Chemistry.	
Raybestos-Manhattan Research Fellow.	
Ritter, Ralph Shelly	Allentown
E.E., LL.B. ( <i>Lehigh University, University of Pennsylvania</i> ). Major: Psychology.	
Rosenfeld, Harry Carl	Phillipsburg, N. J.
B.S. ( <i>Lafayette College</i> ). Major: Education.	
Schick, Leonard Hubert	Bethlehem
B.A. ( <i>Lehigh University</i> ). Major: History.	
Assistant Executive Secretary of Lehigh Alumni Association.	
Editor, Alumni Bulletin.	

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Schlegel, Martha Marie B.A., M.A. ( <i>Moravian College for Women, Lehigh University</i> ). Major*: English.	Allentown
Seaman, Henry B.S., M.S. ( <i>Carnegie Institute of Technology</i> ).	Bethlehem
Shen, Mo-Han B.Sc. ( <i>National Central University</i> ). Major: Chemistry.	KiangSu, China
Smith, Agnes C. A.B., M.A. ( <i>Smith College, Columbia University</i> ).	Bethlehem
Smyser, John Moberley B.S. in Ch.E. ( <i>Massachusetts Institute of Technology</i> ).	Bethlehem
Stearns, Elizabeth Birk B.A. ( <i>Moravian College for Women</i> ).	Bethlehem
Stein, Oscar Llewellyn A.B., A.M. ( <i>Franklin and Marshall College, Teachers College of Columbia University</i> ).	Kutztown
Stever, Mary M. B.S. ( <i>Kutztown State Teachers College</i> ).	Quakertown
Stone, Winfield John B.S. ( <i>Kutztown State Teachers College</i> ). Major: Education.	Allentown
Sun, Chen-Pao B.S., M.S. ( <i>Cheeloo University, Lehigh University</i> ). Major*: Metallurgy.	Shantung, China
Tait, Margaret Mae B.S. ( <i>Muhlenberg College</i> ).	Summit Hill
Taylor, Elizabeth Hewitt B.S. ( <i>Pennsylvania State College</i> ).	Hellertown
Tor, Sadun Servet E.M., M.E.M., M.S. ( <i>Colorado School of Mines, Lehigh University</i> ). Major*: Metallurgical Engineering.	Nazareth
Townsend, Robert Rene B.S. ( <i>Muhlenberg College</i> ). Major: Mathematics.	Allentown
Vaillant, George Herrera B.S. ( <i>Havana University</i> ). Major: Electrical Engineering.	Havana, Cuba
Volheye, Mae Evelyn Stine A.B. ( <i>Muhlenberg College</i> ).	Allentown
Vooz, Mary Elizabeth B.S. ( <i>Kutztown State Teachers College</i> ). Major: English. Assistant Cataloger, Lehigh University Library.	Bethlehem
Walbert, Earle C. Ph.B. ( <i>Muhlenberg College</i> ). Major: Education.	Bethlehem
Walker, William Comstock B.S. in Ch.E., M.S. ( <i>Lehigh University</i> ). Major*: Chemistry. Westvaco Chlorine Products Corporation Research Fellow.	Milwaukee, Wis.

S T U D E N T S

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Wanich, Glenn Creasy	Bethlehem
B.S. in Ch.E. ( <i>Lehigh University</i> ). Major: Chemistry. Graduate Assistant in Chemistry.	
Weber, Kurt Heinz	Englewood, N. J.
B.S. in Eng.Phys. ( <i>Lehigh University</i> ). Major: Physics.	
Weidner, Camille Reuben	Bethlehem
B.S. ( <i>Muhlenberg College</i> ). Major: Education.	
Wilker, Conrad Robert	Palmerton
B.S. ( <i>Muhlenberg College</i> ). Major: Education.	
Wolfe, Glenn Edwin	Bethlehem
B.S. ( <i>West Chester State Teachers College</i> ). Major: Education.	
Zable, Helen Sydney	Bethlehem
B.S. ( <i>Pennsylvania State College</i> ). Major: Chemistry. National Oil Products Company Fellow.	

## UNDERGRADUATE STUDENTS

Arts—Arts and Science	E.M.—Mining Engineering
Bus.—Business Administration	E.P.—Engineering Physics
Ch.E.—Chemical Engineering	Engr.—Engineering
Chem.—Chemistry	G.C.D.—General College Division
C.E.—Civil Engineering	I.E.—Industrial Engineering
E.E.—Electrical Engineering	M.E.—Mechanical Engineering
	Met.E.—Metallurgical Engineering

SUMMER SEMESTER 1944, FALL AND SPRING SEMESTERS  
1944-45

Abell, Ernest George	E.E.-Oct.'44	Philadelphia
Abelow, Howard Jay	Ch.E.-June '47	Rye, N. Y.
Achtermann, Leo Alexander, Jr.	C.E.-Feb.'47	Stroudsburg
Adams, Francis Patrick	Met.E.-June '47	Bethlehem
Adler, George Irwin	Ch.E.-Feb.'47	Bayonne, N. J.
Allen, Charles Wesley III	Bus.-June '47	Ishpeming, Mich.
Allen, Robert	G.C.D.	Newtown, Conn.
Allman, Elmer Lambert	M.E.-Oct.'46	Bethlehem
Alperin, Irwin Ephraim	M.E.-June '45	Scranton
Alperin, Myer Marvin	Bus.-Oct.'46	Scranton
Anderson, Frank John	Arts-June '47	Allentown
Andrews, Paul Chapman	M.E.-Oct.'44	Trenton, N. J.
Angel, Gabriel	I.E.-Feb.'47	Medellin, Columbia, S.A.
Assetto, Valentino John	C.E.-Feb.'47	Coatesville
Attaway, Fred Jones, Jr.	Ch.E.-Oct.'44	Charleston, S. C.
Avakian, Leon Samuel	C.E.-Feb.'47	Bogota, N. J.
Baer, Hans Julius	I.E.-June '47	New York, N. Y.
Baile, George Howard	Met.E.-June '47	Haddonfield, N. J.
Bailey, George Nelson II	Ch.E.-Feb.'47	New Castle, Del.
Bakmazian, Leon Jacob	M.E.-Feb.'47	Wethersfield, Conn.
Baldelli, Essio John	Met.E.-June '45	Lackawanna, N. Y.
Barber, Leonard William	E.E.-June '47	Bethlehem
Barna, Stephen	Arts-Feb.'47	Pottstown
Bartholomew, Walter James, Jr.	E.E.-June '46	Allentown
Bartlett, Bertram Francis	Arts-Feb.'46	Bethlehem
Baskerville, Edward John	Ch.E.-Oct.'47	Paterson, N. J.
Baum, John Furley	E.E.-Feb.'46	Niagara Falls, N. Y.
Beardslee, Alvord Miner	Arts-Feb.'47	Bethlehem
Becker, Edwin Monteith	M.E.-June '47	Penn Valley
*Beckler, Sally Laufer	Arts	Bethlehem
Beears, Kenneth Arthur	C.E.-June '47	Reading
Belmonte, Robert Michael	E.P.-Feb.'47	Bogota, N. J.
Benavides, Isidoro Ramon	E.E.-Feb.'47	Havana, Cuba
Bennett, Floyd Mitchell, Jr.	E.P.-Oct.'46	Brooklyn, N. Y.
Benson, Francis Post, Jr.	E.M.-June '47	Jenkintown
Berman, Fred F.	M.E.-June '45	Bethlehem
Bernard, William	M.E.-Oct.'45	Summit, N. J.
Bevan, John Richard	Met.E.-Oct.'44	Pottsville
Bewley, Donald Thomas	E.E.-Feb.'47	Bethlehem
Bierman, Jordan Baer	Ch.E.-June '47	New Rochelle, N. Y.
Binger, Irving Larry	Ch.E.-June '47	Brooklyn, N. Y.
Bingham, George Herbert, Jr.	E.P.-Feb.'47	Scranton
Birchmire, Calvin Horace	E.E.-June '47	Pennsville, N. J.

S T U D E N T S

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Birnbaum, Ira	M.E.-Feb.'46	New York, N. Y.
Blanco, Nestor	Arts-Oct.'45	Lima, Peru, S. America
Blank, Howard Allen	Met.E.-June '45	Allentown
Bloch, Gilbert Merton	Bus.-June '47	Flushing, N. Y.
Bloecher, Frederick William, Jr.	E.E.-Oct.'44	Kenvil, N. J.
Bluestone, Jules Henry	E.M.-Oct.'44	New York, N. Y.
Bodine, Richard Phillips	M.E.-Feb.'47	Fairfield, Conn.
Boothby, Willard Sands, Jr.	I.E.-Feb.'46	Philadelphia
Borzellino, Salvatore	E.E.-Oct.'47	Paterson, N. J.
Boyer, John Harry	E.E.-Feb.'47	Wilkes-Barre
Brenner, Frank	Ch.E.-Feb.'47	Jamaica, N. Y.
Brewer, Joseph Blake	E.E.-Feb.'47	Allentown
Brossman, Martin Werner	M.E.-Feb.'45	Allentown
Browning, Walter Pharo	E.E.-June '46	Devon
Buccolo, Joseph Peter	Arts-June '47	North Bergen, N. J.
Buck, William Thomas, Jr.	I.E.-Feb.'47	Wyncote
Buehler, Paul Robert	E.E.-June '45	Allentown
Busch, Harry Fort	E.E.-Oct.'44	Wyomissing
Cantwell, Garrett Wright	Ch.E.-Oct.'45	Tulsa, Okla.
Carmody, Thomas Joseph	C.E.-Oct.'47	Mt. Vernon, N. Y.
Carr, Francis Thomas	Ch.E.-Oct.'44	Pottsville
Carroll, Richard Patrick	Bus.-Feb.'47	Meriden, Conn.
Carthage, William Henry	M.E.-Oct.'47	Dover, N. J.
Cassler, Robert William, Jr.	Arts-Feb.'47	Hazleton
Castle, Donald Ward	Bus.-Feb.'47	Montclair, N. J.
Church, William Lewis	M.E.-Feb.'47	Lancaster
Chutter, Raymond Allan	Ch.E.-June '47	Glen Rock, N. J.
Cliff, Thomas Edward	Arts-Oct.'46	Coopersburg
Cockley, Robert Reber	Ch.E.-Feb.'47	Wyomissing
Cohen, Arnold Marvin	I.E.-Oct.'46	Camden, N. J.
Cohen, Nathan	Ch.E.-Feb.'46	Bethlehem
Compton, Earle Augustus, Jr.	Bus.-Feb.'47	Clinton, N. J.
Cooper, Russell Andrew	I.E.-Feb.'46	Harrisburg
Cotter, Donald Raymond	E.E.-Oct.'46	Lansdale
Craig, Richard Axtell	E.P.-Feb.'46	Maplewood, N. J.
Cramer, Granville Robert	M.E.-Feb.'46	Morris Plains, N. J.
Creadore, Elmer Donald	M.E.-Feb.'47	Harrison, N. Y.
*Crum, Mary Lyle	Arts	Bethlehem
Culp, Charles Richard	E.P.-Feb.'47	Gettysburg
Cummings, George William	M.E.-June '47	New York, N. Y.
Cummins, Alden Curry, Jr.	Bus.-June '47	Youngstown, Ohio
Cunningham, Thomas Charles	Met.E.-Feb.'47	New York, N. Y.
Curtis, Robert Bartlett	E.P.-June '45	Bethlehem
Dalzell, Ross Houston	M.E.-June '47	Pittsburgh
Danes, Edward Nelson, Jr.	Chem.-June '46	Rockville Centre, N. Y.
Danielowicz, Bernard Albin	Bus.-Oct.'47	Edwardsville
Dashifsky, William	E.P.-Oct.'46	St. Clair
Daversa, Charles Angelo	Bus.-Oct.'47	Waterbury, Conn.
Dawley, Webster	M.E.-June '47	Plainfield, N. J.
Day, William James	Bus.-June '45	South Orange, N. J.
DeCowksy, George Nestor	E.E.-Oct.'44	Pennsburg
Deisher, John Carroll, Jr.	I.E.-June '47	Royersford
Dene, Shafto Hartzell	Ch.E.-June '47	Pelham Manor, N. Y.
Dennis, Donald Munroe	E.E.-Feb.'47	Upper Montclair, N. J.
Derr, Donald Bruce	E.E.-Feb.'47	Clifton, N. J.
Dexter, Frederick Vincent, Jr.	I.E.-June '47	Brooklyn, N. Y.

Dicke, Allen August, Jr.	M.E.-June '45	Montclair, N. J.
Diehl, Donald Nonnemaker	M.E.-June '47	Bethlehem
DiMenichi, Nicholas Angelo	M.E.-Feb.'47	Rome, Italy
Dinon, Alfred John	E.E.-June '46	Upper Darby
Dintenfass, Maurice Allen	Arts-Feb.'46	Newark, N. J.
DiSpirito, Vincent J.	C.E.-Oct.'46	Freeland
Donaghay, Henry Winthrop, Jr.	Ch.E.-June '46	Wynnewood
Doster, Richard Walper	Arts-Feb.'47	Bethlehem
Douglas, Henry Bowman	M.E.-June '47	Willoughby, Ohio
Downes, Russell Conwell	Ch.E.-Oct.'45	Lymbrook, N. Y.
Downs, Charles Lehman, Jr.	E.E.-June '46	Island Park, N. Y.
Downs, James Douglas	Arts-Feb.'46	Allentown
Dussinger, William Alexander	M.E.-Oct.'47	Allentown
Dyer, Robert Logan	M.E.-June '47	Philadelphia
Egan, John Edward II	C.E.-Oct.'47	Elkins Park
Ely, Clyde Sayre	Bus.-Oct.'47	Morristown, N. J.
Entwistle, David Compton	M.E.-Feb.'47	Maplewood, N. J.
Epstein, Jon	Arts-Feb.'47	New York, N. Y.
Eu, Alexander Keng-Kee	C.E.-June '47	Merion
Ewing, Buchanan	Bus.-June '45	Trenton, N. J.
Facciano, Peter Pasquale	C.E.-Oct.'45	Bethlehem
Fair, Robert James Andrew, Jr.	Bus.-Oct.'46	Pittsburgh
Fatzinger, Harold Vanlear	M.E.-June '47	Northampton
Fegely, Wayne David	E.E.-Feb.'47	Mertztown
Fenstermacher, Harold Granville	M.E.-Oct.'47	Flourtown
Ferguson, Paul Bruce	M.E.-June '47	Philadelphia
Fiamingo, Gerald	M.E.-Feb.'47	Vineland, N. J.
Fife, Martin Dolins	Arts-Feb.'47	New York, N. Y.
Finch, George Nelson	Ch.E.-Feb.'47	West Orange, N. J.
Fischer, George Frederick, Jr.	M.E.-June '47	Irvington, N. J.
Fisher, Alvin Henry, Jr.	E.P.-Feb.'47	Boyertown
Fortosis, Anthony Constantine	Bus.-Oct.'44	Bethlehem
Fox, Leonard Pincus	Ch.E.-Oct.'47	Brooklyn, N. Y.
Fox, Victor Warren	Ch.E.-Feb.'45	Asbury Park, N. J.
Frankley, Edgar Allan	E.E.-Oct.'44	Forest Hills, N. Y.
Franklin, Donald Richard Lee	Bus.-June '45	New York, N. Y.
Franz, Paul Justus, Jr.	Bus.-Oct.'44	Elkins Park
Frey, Robert Godfrey Widmer	C.E.-June '45	Allentown
Friedman, Bernard	M.E.-June '47	Newark, N. J.
Funk, Roger Smith	M.E.-June '45	Ivyland
Garfunkel, James Henry	E.E.-Oct.'47	Nassau, Bahamas
Geraci, Frederic Entress	Bus.-June '47	Dobbs Ferry, N. Y.
Gerb, David Martin	Arts-Oct.'45	Somerville, N. J.
Glatzer, Seymour	Arts-Oct.'46	Jamaica, N. Y.
Gluck, Michael John	Ch.E.-Feb.'45	New York, N. Y.
Golden, James Eagen	E.M.-Oct.'44	West Pittston
Goodman, Allen Jay	Arts-June '46	New York, N. Y.
Graber, Ralph Schultz	Arts-Feb.'46	East Greenville
Granese, Albert Rudolph	M.E.-June '47	Bridgeport
Greene, Richard Frank	E.P.-Feb.'46	Brooklyn, N. Y.
Grell, Frederick Charles	M.E.-June '47	Brooklyn, N. Y.
Griffis, Richard Wayne	G.C.D.	Bethlehem
Grim, John Calvin	Bus.-June '45	Topton
Grobleski, Albert George III	Ch.E.-June '47	Trucksburg
Gross, Henry Edward	Arts-June '46	Elkins Park
Gruhn, Donald Mitchell	Bus.-Feb.'47	New York, N. Y.

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Gumble, Harold Arthur	M.E.-Feb.'47	Paupack
Gursky, Ernest Roy	E.E.-June '47	Tamaqua
Hafner, Charles Gilbert	Arts-Oct.'45	Bethlehem
Hafft, Joseph Rudolph	Ch.E.-Feb.'47	Allentown
Halfacre, George Frederick, Jr.	Arts-Feb.'47	Palmerton
Halfacre, Robert Ernest	Chem.-Feb.'47	Palmerton
Hall, Herbert William	C.E.-June '46	Hempstead, N. Y.
Hammie, Donald Eugene	E.E.-June '45	Hanover
Hanley, John Edmond	Arts-June '46	Brooklyn, N. Y.
Harlan, William Knott, Jr.	M.E.-June '47	Easton
Harman, Henry Martyn, Jr.	Bus.-Feb.'47	Merion
Harnish, Harry Gerald	M.E.-June '45	Willow Street
Harriger, Clarence Monroe, Jr.	Ch.E.-Oct.'44	Beaverdale
Harris, George Walter	C.E.-June '47	Plainfield, N. J.
Harris, John Arthur Ernest	Arts-Feb.'47	Wayne
Hartman, David Paul	M.E.-Oct.'47	Pittsburgh
Hartung, Chester Warren	Bus.-June '47	New York, N. Y.
Heil, Sterling Henry	G.C.D.	Easton
Heilmann, Richard Lewis	M.E.-June '47	Lebanon
Heller, Edward France	C.E.-Feb.'47	Stroudsburg
Heller, Norman Bernard	Arts-June '47	New Rochelle, N. Y.
Herder, David James	E.E.-Feb.'47	Somerville, N. J.
Herman, George Haskell	M.E.-Feb.'47	New York, N. Y.
Herron, Carl Jacob	E.E.-Feb.'47	Pittston
Heyman, Horace Kerry	Bus.-June '47	Short Hills, N. J.
Hildenbrandt, Robert George	Ch.E.-Feb.'47	Pottsville
Hinlein, Bruce Milton	I.E.-June '47	Philadelphia
Hoagland, Ira Elston	Arts-Oct.'46	Hackettstown, N. J.
Hobé, Robert Donald	Bus.-Feb.'47	New York, N. Y.
Hoffman, Irving	C.E.-Feb.'46	Newark, Del.
Holcombe, Edward Joseph	C.E.-June '47	Lambertville, N. J.
Hollinger, Ralph Martin	M.E.-Oct.'47	Lancaster
Hollingsworth, John Herbert	M.E.-Feb.'47	Marshallton, Del.
Hubert, Marvin Howard	M.E.-Oct.'46	Pelham Manor, N. Y.
Huyett, Richard Caldwell	M.E.-June '46	Birdsboro
Iacocca, Lido Anthony	I.E.-June '45	Allentown
Inglese, Louis	M.E.-June '45	Allentown
Inwright, Norman Everett	M.E.-Feb.'47	Moorestown, N. J.
Jeffeiris, Gilpin Hazard, Jr.	M.E.-Feb.'47	Passaic, N. J.
Jeffery, Ronald Henry	Ch.E.-Feb.'47	Fair Haven, N. J.
Johnson, Clinton Heath, Jr.	I.E.-June '47	Towson, Md.
Jones, Owen John, Jr.	Ch.E.-June '46	Dauphin
Jones, Richard Herckman	M.E.-Feb.'47	Weissport
Jones, Robert Edgar	Bus.-June '46	East Williston, N. Y.
Kangis, John Harry	Bus.-June '46	Lynn, Mass.
Kaplan, Martin Jerome	Ch.E.-Feb.'45	Allentown
Karlik, Robert John	E.E.-Feb.'47	Hazleton
Keen, C. Merris, Jr.	Arts-Feb.'47	Salem, N. J.
Kern, Harry Burgess	Arts-June '45	Catawissa
Kerrick, Edgar Alfred	Ch.E.-Oct.'47	Blakeslee
Kilroy, William Joseph, Jr.	M.E.-June '47	Allentown
Kirk, David Clark, Jr.	Ch.E.-Oct.'44	Kearny, N. J.
Kitson, Peter James	E.E.-Feb.'46	Westfield, N. J.
Klinger, Mark Andrew	Met.E.-June '47	Bethlehem
Klos, James Henry	I.E.-June '47	Jenkintown
Knetz, Wallace Joseph, Jr.	Ch.E.-Feb.'47	Allentown

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Kocher, Frederick William	Ch.E.-Feb.'46	Allentown
Kochon, Leonard John	G.C.D.	Allentown
Kolb, Donald Clarence	M.E.-June '47	Harwood, Md.
Konapelsky, Paul Michael	M.E.-June '47	Cementon
Koran, Joseph Eugene	M.E.-Feb.'47	Nesquehoning
Kovach, Joseph, Jr.	Bus.-Feb.'46	Bethlehem
Kovar, Sidney Joel	E.E.-Feb.'47	Clifton, N. J.
Kramer, John Haines	Bus.-Oct.'46	Allentown
Krauss, Richard Coons	C.E.-Feb.'47	Elkins Park
Kullman, Donald Alan	Arts-Oct.'47	Newark, N. J.
Kvochak, John Louis	Ch.E.-Feb.'47	Bethlehem
Kynor, Herbert Dailey, Jr.	M.E.-Feb.'46	Hazleton
Landstreet, Fairfax Stuart	Ch.E.-Feb.'46	Fairfax, Va.
Landy, Robert Jay	E.E.-Oct.'46	Mt. Vernon, N. Y.
Laurencot, Rene Edward	C.E.-June '45	Brooklyn, N. Y.
Lavine, Richard Ellis	Arts-Oct.'47	Trenton, N. J.
Lehet, George, Jr.	Ch.E.-June '46	Wilkes-Barre
Lenhart, James Herbert	E.P.-Oct.'47	Allentown
Lenney, Ronald J.	Bus.-Oct.'47	New York, N. Y.
Leschak, Kuzma, Jr.	E.E.-June '45	Jermyn
Lewis, Thomas Edward	Arts-Oct.'46	Pocono Pines
Lichty, Donald Sherwood	M.E.-June '47	Allentown
Lindholm, Cornelius, Jr.	C.E.-June '45	West Englewood, N. J.
Linker, Frederick Robert	Arts-Feb.'45	New York, N. Y.
Littlefield, Parker	Arts-Feb.'47	Haworth, N. J.
Loch, Luther Daniel	Ch.E.-Oct.'44	Allentown
Loizeaux, Timothy Roberts, Jr.	M.E.-June '47	Plainfield, N. J.
Long, James Thomas	M.E.-Feb.'47	Ridley Park
Lourié, Sylvain	M.E.-June '47	Kew Gardens, N. Y.
Luckenbach, Edward Cooper	Ch.E.-Feb.'46	Bethlehem
MacAdams, Richard Joseph	M.E.-June '46	Allentown
MacKinnon, Robert Kendall	G.C.D.	Newark, N. J.
Maco, Paul Stephen	I.E.-Oct.'47	Bethlehem
Madenford, Edward Karl	M.E.-June '47	Pottsville
Maier, Arthur Richard	Chem.-Feb.'47	Rahway, N. J.
Majczan, Frank Louis	Bus.-Feb.'45	Bethlehem
Manning, Edward George	E.E.-Oct.'45	Bethlehem
Marcks, Donald Alton	Bus.-Feb.'45	Nazareth
Marcus, Bernard Jacob	Bus.-Feb.'47	Mt. Vernon, N. Y.
Margerison, Albert Earl, Jr.	E.E.-June '47	Elkins Park
Margie, Walter Edward II	Ch.E.-Oct.'44	West Pittston
Master, Hazen Parks	Bus.-Feb.'47	Boston, Mass.
Matthes, Andrew Savage Merrill	Ch.E.-Oct.'47	Cleveland, Ohio
Mayer, Robert Walter	Ch.E.-June '45	Reading
McGonegal, Russell John	M.E.-June '47	Rutherford, N. J.
McGrath, Thomas James	M.E.-June '47	Norwalk, Conn.
McKay, Ronald Gilmore	Ch.E.-Feb.'46	Garden City, N. Y.
McMullen, Randolph Bond	Bus.-Feb.'47	Shrewsbury, N. J.
McNamara, Thomas William	E.E.-Feb.'47	Wilkes-Barre
McQuade, Lynn Ware	M.E.-June '47	Haddonfield, N. J.
Mearns, James Holmes III	M.E.-Oct.'47	Philadelphia
Mechanic, William Haskel	Bus.-Feb.'47	Allentown
Melloy, George Florian	Met.E.-June '45	Bethlehem
Memmert, David Paul	E.M.-Oct.'47	Bethlehem
Mengle, Lewis Irwin	G.C.D.	Allentown
Mertz, Robert Edwin	Arts-Feb.'47	Pittsburgh

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Mertz, William Richard	E.E.-Feb.'47	Pittsburgh
Mesirov, Richard Beryl	E.E.-Feb.'47	Upper Darby
Michie, William Henry	E.E.-Feb.'47	New Britain
Miksitz, Frank J.	G.C.D.	Coplay
Miller, Robert Howard	M.E.-Feb.'47	Fort Washington
Mininberg, Harvey Bruce	Arts-June '47	Brooklyn, N. Y.
Mitchell, Charles Gray	M.E.-Feb.'47	Brooklyn, N. Y.
Moore, Donald Hugh	M.E.-Oct.'47	Southampton, N. Y.
Moore, William Robert	I.E.-Feb.'45	Jenkintown
Moretz, Lawrence Alexander	E.E.-June '47	Harrisburg
Morgart, Frank Hartley	M.E.-June '47	York
Mulherin, Joseph Harold	Met.E.-Oct.'45	Scranton
Murray, Willard Augustus	M.E.-June '45	Wyoming
Myers, Joseph Hooker	Arts-Oct.'44	Kingston
Nash, Claude Walter	Ch.E.-Feb.'46	Jackson Heights, N. Y.
Neal, Russell Elwood	C.E.-Oct.'45	Bethlehem
Neimeyer, Henry Isaac	Bus.-Oct.'45	Emmaus
Newhard, Fred Jerome, Jr.	Ch.E.-Feb.'47	Allentown
Nicholasen, Paul Frederick	Ch.E.-Oct.'46	Nazareth
Nichols, Robert Allen	Ch.E.-Feb.'47	Bethlehem
Niewenhous, Theodore Hyatt	Bus.-Oct.'45	Hyattsville, Md.
Nippert, Charles Raymond	M.E.-Oct.'46	Allentown
Normand, Leonard Joseph	C.E.-June '47	Bethlehem
Norris, Richard Alfred	Ch.E.-Feb.'47	Ventnor City, N. J.
Ochs, Robert Hanson	E.E.-Feb.'47	North Quincy, Mass.
Orcutt, Edmund Orville	C.E.-Oct.'47	Philadelphia
Orlando, Salvatore Peter	E.E.-Oct.'47	Reading
Osman, Robert James, Jr.	Ch.E.-Feb.'47	Allentown
Ospina, Eduardo	I.E.-June '47	Medellin,Columbia,S.A.
Pagnotti, Joseph Ross	E.E.-Feb.'47	Old Forge
Pappas, Nicholas Louis	Ch.E.-June '47	Manhasset, N. Y.
Parker, Robert Wilson	M.E.-June '47	Hyattsville, Md.
Pasquini, Anthony Adolph	M.E.-Oct.'46	Bakersfield, Cal.
Pearsall, Clarence Illingworth	Arts-June '47	Bala-Cynwyd
Pecsek, Joseph	E.E.-Feb.'46	Bethlehem
Perez, Eduardo Antonio	G.C.D.	Maracaibo, Venezuela
Perley, Albert Slocomb	M.E.-Oct.'44	Black Mountain, N. C.
Peterson, Matthew Bernard	Met.E.-June '47	Wood-Ridge, N. J.
Pettit, William Dunlap	Bus.-June '45	Pittsburgh
Pharo, John William	E.E.-Oct.'44	Bethlehem
Philipp, Warren Henry	Ch.E.-Feb.'47	Queens Village, N. Y.
Phillips, Lee Wolfe	Bus.-Feb.'47	Allentown
Pieski, Edwin Thomas	Chem.-June '45	Dickson City
Pineda, Victor Manuel José	E.E.-Feb.'46	Maracaibo, Venezuela
Polstein, Robert	Arts-Feb.'47	Rockville Centre, N. Y.
Pomerantz, Charles Bernard	Ch.E.-Oct.'47	New York, N. Y.
Ponganis, Robert Anthony	M.E.-June '47	Scranton
Pontier, Charles Francis	E.E.-June '47	Morristown, N. J.
Potosky, Walter Victor	C.E.-June '47	Clifton, N. J.
Potts, Douglas Long	Bus.-June '46	Cressona
Price, Donald Kent	M.E.-Feb.'47	Perkasie
Probst, John Stanley, Jr.	E.E.-Oct.'46	East Aurora, N. Y.
Protter, Eric	Ch.E.-Feb.'47	Forest Hills, N. Y.
Purdy, Samuel Moreau	Ch.E.-June '47	New York, N. Y.
Raiff, Frederic Kaufman	Bus.-June '47	New York, N. Y.
Ramberg, Einar Melvin	M.E.-Feb.'46	Glen Head, N. Y.

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Ramberg, John Douglas	G.C.D.	New York, N. Y.
Ramsey, Harry Bohlin	Ch.E.-Oct.'46	New York, N. Y.
Randall, David Virgil	Arts-Oct.'45	Kingston
Rasmussen-Taxdal, David Samuel	E.E.-Oct.'46	Nanticoke
Ratway, John	Ch.E.-Feb.'46	Shaf't
*Raynor, Georgia Emily	Arts	Bethlehem
Reehl, Robert Frederick	Arts-Feb.'47	Orlando, Fla.
Reese, Allen Musgrave	C.E.-Feb.'46	Toledo, Ohio
Rehnert, Francis George	C.E.-June '47	Pottsville
Reichman, Marvin Stanley	Arts-Feb.'47	New York, N. Y.
Reinbrecht, Charles Henry, Jr.	M.E.-June '47	Souderton
Reiterman, William Frank, Jr.	Arts-June '45	Allentown
Rengert, Joseph Stephen	M.E.-June '45	Allentown
Rheiner, John Bernard Thomas	G.C.D.	Bethlehem
Richards, John Henderson, Jr.	M.E.-June '46	Mt. Lebanon
Richards, John Stuart	M.E.-Feb.'47	Upper Darby
Richardson, Lunsford, Jr.	Arts-June '46	Greenwich, Conn.
Richardson, Warren Bird	Ch.E.-Feb.'47	Montville, N. J.
Roberts, Chester Sayre, Jr.	I.E.-Oct.'47	Philadelphia
Roberts, Frank Ralston	E.E.-Feb.'47	Norristown
Roberts, Paul Myron	Ch.E.-Feb.'47	Rockville Centre, N. Y.
Rodenbach, Donald Eston	Bus.-Feb.'47	Bethlehem
Rosenberger, George Ralph	E.E.-June '47	North Wales
Rosenthal, Richard Phillips	M.E.-June '47	Branford, Conn.
Ross, Arthur Isaac, Jr.	Ch.E.-Feb.'47	Washington, D. C.
Roth, Charles Allen	Arts-June '47	Allentown
Roth, Forrest Adonis	M.E.-June '47	Slatington
Royer, Richard Alan	I.E.-Feb.'47	Westfield, N. J.
Rushton, Alvey Bertan	E.M.-Feb.'47	New Kensington
Russell, Marcus Holmes	Ch.E.-Feb.'47	Toms River, N. J.
Rust, Philip Schuyler	E.P.-Oct.'44	New Brunswick, N. J.
Ruthhart, Richard Mitman	Chem.-Feb.'45	Bethlehem
Safeldi, John Stephen	G.C.D.	Northampton
Said, Michael	C.E.-June '47	New York, N. Y.
Saltzman, Murray	Bus.-Feb.'47	Allentown
Santoro, Anthony Paul	Arts-June '47	Bethlehem
Sass, Sherman Grossman	Bus.-June '46	Allentown
Sauber, James William	E.E.-Feb.'46	Youngstown, Ohio
Savidge, Roland Edward	Met.E.-Feb.'47	Hackensack, N. J.
Savopoulos, Michael Demeter	Met.E.-Oct.'47	Bethlehem
Sawhill, Malcolm Campbell	Arts-June '47	Highlands, N. J.
Sawhill, Robert Arthur	Arts-Oct.'46	Highlands, N. J.
Sawruk, Stephen	Chem. June '47	Allentown
Scariff, Paul Brown	Bus.-June '45	Westfield, N. J.
Scheirer, Stephen Louis	Arts-Spl.	Bethlehem
Scheirer, Russell E., Jr.	M.E.-Feb.'47	Fullerton
Schloss, Nathan	Bus.-Feb.'47	Baltimore, Md.
Schmoyer, Donald Walter	Bus.-Oct.'44	Allentown
Schultz, Hyman	Bus.-Feb.'47	Allentown
Schulz, Robert Ernst	Arts & Eng'r. Oct.'46	Coopersburg
Schvey, Malcolm Henry	Arts-June '47	New York, N. Y.
Schwartz, Morton Kanter	Ch.E.-Feb.'46	Wilkes-Barre
Schwartz, Seymour Melvin	C.E.-Oct.'45	Jamaica, N. Y.
Schweitzer, Edward Frederick	Ch.E.-June '45	Bloomfield, N. J.
Schwemlein, William Hemmerich	M.E.-Feb.'46	Parkersburg, W. Va.

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Seasholtz, Elwood Franklin	E.P.-Oct.'46	Allentown
Sechrist, Harry Spurgeon	E.E.-June '45	Hellam
Seeley, George Hill	E.P.-June '47	Highlands, N. J.
Segal, Sylvain, Jr.	Arts-Feb.'47	Flushing, N. Y.
Senkowski, Walter Theodore	C.E.-June '47	Philadelphia
Sennello, William Albert	E.E.-Oct.'46	Whitestone, N. Y.
Shade, Ray Walton	E.P.-June '47	Souderton
Shane, Marvin	Ch.E.-Oct.'45	Bethlehem
Sherwood, Kenneth Wesley	Bus.-Feb.'47	Englewood, N. J.
Shettel, Don Landis	Ch.E.-Feb.'46	Harrisburg
Shewmon, Daniel Center	E.M.-Oct.'44	Plainfield, N. J.
Shipherd, John Jay	Bus.-Feb.'46	Easton, Md.
Shlansky, Felix Martin	Arts-June '47	Brooklyn, N. Y.
Shook, Theodore Albert	Ch.E.-June '46	Bethlehem
Simon, David Emanuel II	Ch.E.-Feb.'46	Philadelphia
Smith, Burton Leidy	Bus.-Oct.'46	Easton
Smith, Horace Rodman	Ch.E.-Oct.'47	Margate, N. J.
Smith, James Edgar, Jr.	Arts-Oct.'45	Riegelsville
Smith, John Elwin	M.E.-Oct.'47	Philadelphia
Smith, Richard Thomas	E.E.-Feb.'46	Allentown
Smith, Robert Vincent, Jr.	Bus.-Oct.'47	Irvington, N. J.
Smith, Roland Young	C.E.-Oct.'47	York
Smyth, Harold Gordon	I.E.-June '47	Pottsville
Snyder, Frank Ronald	Bus.-Oct.'45	Minersville
Snyder, Herman George Peter	M.E.-Oct.'44	Slatington
Snyder, John Charles	E.E.-Oct.'47	Philadelphia
Snyder, William Tredway	M.E.-Feb.'47	Carlisle
Solis, David Hays, Jr.	I.E.-Feb.'47	Elkins Park
Solomon, Robert Franklin	I.E.-June '47	Silver Spring, Md.
Somach, Norman	Bus.-Oct.'47	Allentown
Soule, Lawrence Clement, Jr.	Bus.-Feb.'47	Essex Falls, N. J.
Southworth, William Tracy	E.P.-Feb.'47	Philadelphia
Spangler, Henry Andrew	I.E.-Oct.'46	Scarsdale, N. Y.
Spencer, Frederick Norman	Arts-June '46	Woodbridge, N. J.
Spillar, Ernest Hanus	M.E.-Feb.'47	Forest Hills, N. Y.
Spindler, Charles	C.E.-Oct.'46	Jamaica, N. Y.
Staley, Richard Allen	M.E.-Feb.'47	Reading
Stemler, Richard Stinson	M.E.-Feb.'47	Palmerton
Sternier, William Arthur	G.C.D.	Allentown
Stettner, Max Harvey	Bus.-June '45	Allentown
Stewart, Hugh Russell, Jr.	M.E.-June '47	Philadelphia
Stocker, Frederick Doster	Arts-Feb.'47	Bethlehem
Stoll, Fred Charles	C.E.-Feb.'47	New York, N. Y.
Stoll, Malcolm Harold	Bus.-June '46	New York, N. Y.
Stoneback, Donald Frank	Ch.E.-Oct.'47	North Wales
Strayer, Carl Wayne	Ch.E.-Feb.'46	York
Strehle, Frank Eberly	E.E.-Feb.'45	Philadelphia
Strober, Bennett A.	M.E.-Oct.'46	Jamaica, N. Y.
Swartley, Robert Weikel	E.E.-Feb.'46	Line Lexington
Swift, Donald Warren	Bus.-June '47	Tenafly, N. J.
Taylor, Edmund Randolph, Jr.	M.E.-Feb.'47	Pelham, N. Y.
Taylor, Howard Eltinge	Bus.-June '47	Belleville, N. J.
Temoshok, Stephen Henry	Ch.E.-Feb.'47	Northampton
Tenenholz, Arthur Mitchell	E.P.-Feb.'47	Frackville
Theile, Kenneth William	Ch.E.-Feb.'47	Tenafly, N. J.
Tirrell, John Francis	M.E.-Oct.'46	Phillipsburg, N. J.

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Tove, Roger Henry	Arts-June '47	Brooklyn, N. Y.
Treser, Robert Morris	Ch.E.-June '45	Richmond, Va.
Trexler, John Peter	Arts-June '47	Allentown
True, Donald Nathan	Arts-June '47	Evansville, Ind.
Tuberty, John Fox	Arts-Feb.'46	Allentown
Turn, Kenneth Edwin, Jr.	Arts-Oct.'47	West Hartford, Conn.
Turner, Herbert Branch	M.E.-June '47	Saranac Lake, N. Y.
Turner, John Everton, Jr.	Ch.E.-Feb.'46	New Brunswick, N. J.
Tuttle, Charles Harry	Met.E.-June '46	Brooklyn, N. Y.
Vachon, Ross Peter	Bus.-June '45	Seattle, Wash.
VanWagenen, Donald	Ch.E.-Feb.'47	West Hurley, N. Y.
VanWinkle, Theodore Lloyd	Ch.E.-Feb.'47	Rutherford, N. J.
Veit, William Piercy	M.E.-June '47	St. Davids
Vélez, Hernando	Ch.E.-Oct.'47	Medellin, Columbia, S.A.
Vetrosky, Albert Eugene	Arts-June '45	Brooklyn, N. Y.
Victor, George	Ch.E.-June '47	New York, N. Y.
Volansky, Elmer Joseph	Ch.E.-Oct.'47	Mahanoy City
vonBergen, Fritz	Ch.E.-Oct.'44	Clifton, N. J.
Vostovich, Joseph Edward	Ch.E.-Feb.'47	Wilkes-Barre
Wagman, Gerald Howard	Chem.-Feb.'46	Hillside, N. J.
Waldor, Jerome Noel	Arts-Oct.'47	Newark, N. J.
Walkerman, Robert Koehl	M.E.-Feb.'47	Lakewood, N. Y.
Wallace, James Denithorne	Bus.-Oct.'47	South Orange, N. J.
Wallace, William Minto	Bus.-June '47	South Orange, N. J.
Wallick, Robert Daniel	E.E.-Oct.'45	Washington, D. C.
Wallshein, Allan	Arts-June '47	Brooklyn, N. Y.
Walters, Donald Bryce	Ch.E.-Oct.'44	Bethlehem
Wareck, Donald Joel	Arts-Feb.'47	Lawrence, N. Y.
Wahner, William George	Ch.E.-June '45	Haverford
Weida, Robert Lincoln	E.P.-Oct.'47	Elmhurst, N. Y.
Weinreb, Marvin Seymour	Arts-Oct.'46	North Bergen, N. J.
Weiskopf, Daniel Albert	Arts-June '45	Bethlehem
Weisman, Barton David	Arts-Oct.'47	Hudson, N. Y.
Welliver, William Emory	M.E.-June '47	Trenton, N. J.
West, Frank Edward	Ch.E.-Feb.'47	Scranton
Wetzel, Lewis Dreese	E.E.-Oct.'46	Beaver Springs
Wheeler, George Charles, Jr.	Met.E.-Oct.'44	West Englewood, N. J.
Wilkinson, Charles Alexander	G.C.D.	Bethlehem
Williams, Donald Frederick	Met.E.-Oct.'46	Allentown
Williams, Richard	Ch.E.-June '45	Huntington, W. Va.
Wilson, Alvin Turner, Jr.	M.E.-Oct.'46	Columbus, Ga.
Wilson, Sanford Wright, Jr.	Ch.E.-Oct.'45	Williamsport
Winco, Thomas Robert	Ch.E.-Oct.'44	Philadelphia
Wolf, Donald Alan	Ch.E.-Feb.'46	Washington, D. C.
Woltman, Philip Richard	M.E.-Feb.'47	York
Wood, Duncan MacKenzie, Jr.	M.E.-Oct.'47	New York, N. Y.
Young, Irwin Wallace	M.E.-June '47	Rockville Centre, N. Y.
Zimmerer, Carl Francis	M.E.-Feb.'47	Nutley, N. J.
Zimmermann, John	M.E.-Feb.'46	Philadelphia
Zwart, Herman Cornelius	Ch.E.-Oct.'47	Clifton, N. J.

\* Enrolled in Summer Semester only.

S T U D E N T S

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ADULT EDUCATION

Summer Semester 1944, Fall and Spring Semesters 1944-45

Alex, Shirley May	Allentown
Ammann, Clara Bradley	Bethlehem
Aoki, Minora	Springtown
Biro, Gizella	Bethlehem
Boyer, Helen Bieber	Bethlehem
Brubaker, Eugene Martin	Bethlehem
Buckland, Ann Morgan	Allentown
Burley, Ida May	Tatamy
Caretta, Lillian Caroline	Bethlehem
Claver, Sister Mary	Phillipsburg, N. J.
Cressman, Austin Meyer	Bethlehem
Dahlof, Vivian	Bethlehem
Dalkner, Frank J.	Allentown
Dashe, John	West Easton
Davis, Elsie Jannet	Bethlehem
Drebert, Florence Marie	Bethlehem
Druckenmiller, Jean Harwick	Emmaus
Eddinger, Lucille	Bethlehem
Erdell, John B.	Bethlehem
Fels, Catherine Elizabeth	Allentown
Fisher, Robert Lamar	Schuylkill Haven
Fitzgibbons, Lenora Petty	Bethlehem
Forjohn, Henry B.	Philadelphia
Fox, Marjorie Bell	Bethlehem
Fox, Norman	Bethlehem
Gaffney, Mary Marcia	Bethlehem
Garger, Lillian Kathryn	Northampton
Geiger, Marie Olga	Allentown
Goodman, Anne Taube	Bethlehem
Goodman, Ellen	Bethlehem
Goodman, Sophia	Bethlehem
Goodwill, John Joseph	Phillipsburg, N. J.
Gowell, Anthony	Bethlehem
Hartzell, Leah Elizabeth	Easton
Hauck, Bertha Adams	Bethlehem
Heider, Anna	Butztown
Howells, Lewis Miles	Catasauqua
Jacoby, Althea Burg	Bethlehem
Kaplan, Evelyn	Bethlehem
Kashner, Margaret Henrietta	Bethlehem
Kleckner, Evelyn Clare	Allentown
Kravits, Richard	Philadelphia
Kurtz, Helen Weaver	Allentown
LeVan, Ambrose Edwin	Sellersville
Major, Margaret	Bethlehem
Marquardt, Jeanne Barbara	Allentown
Matz, William Wismer	Bethlehem
McCarthy, Daniel Lawrence, Jr.	Bethlehem
McNerney, Rita	Bethlehem
Mitman, Matilda Ludmilla	Bethlehem
Moore, Mildred	Bethlehem
Moyer, Robert E.	Allentown

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Neff, Elizabeth G.	Bethlehem
Norwalk, Carol	Bethlehem
O'Donnell, Frances A.	Bethlehem
Pattison, Robert	Allentown
Phillips, Ora Klingeman	Mahanoy City
Pierce, Howard Koplin	Bethlehem
Politi, Adele Ethel	Bethlehem
Posnak, David Louis	Brooklyn, N. Y.
Reiter, Marguerite Katherine	Allentown
Scholl, Calvin George	Bethlehem
Serfass, Wilson Alvin	Bethlehem
Siegfried, Bertram Williams	Bethlehem
Smith, Virginia Sardon	Bethlehem
Stetten, Paul	Bethlehem
Stiepel, Jack	Easton
Sweetz, Vicky Elizabeth	Bethlehem
Tretheway, Florence Leona	Bethlehem
Walbert, Earle Clayton	Bethlehem
Walburga, Sister Mary	Phillipsburg, N. J.
Walker, Gladys	Easton
Walter, Carl Steward	Easton
Watson, Mary Elizabeth	Maplewood, N. J.
Weiner, Josephine	Bethlehem
Young, George Logan	Hellertown
Young, Judith Elizabeth	Pasadena, Cal.

S T U D E N T S

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**SUMMER SESSIONS, 1944**

Barton, Sarah Elizabeth B.A. ( <i>Moravian College for Women</i> )	Bethlehem
Bealer, Carolyn Maude B.A. ( <i>Moravian College for Women</i> )	Bethlehem
Bennett, John Harold	Bethlehem
Brader, Henry Milton B.S. ( <i>Muhlenberg College</i> )	Kutztown
Burdick, Bertha Olga B.S. ( <i>West Chester State Teachers College</i> )	Palmerton
Cliff, Alethea Beatrice B.A. ( <i>Moravian College for Women</i> )	Coopersburg
Cump, Guy B.S. ( <i>Gettysburg College</i> )	Nazareth
David, Marguerite Steigerwalt	Ashfield
Deischer, Howard Knauss Ph.B., M.A. ( <i>Muhlenberg College, University of Pennsylvania</i> )	Emmaus
Dickisson, Thomas L. B.A., B.S. in L.S. ( <i>Moravian College, Drexel Institute</i> )	Bethlehem
Dodd, Gilbert Blake B.S. ( <i>East Stroudsburg State Teachers College</i> )	Bethlehem
Dornbach, Evelyn Marion B.A. ( <i>Ursinus College</i> )	Allentown
Finelli, Carmela Emilia B.A. ( <i>Ursinus College</i> )	Roseto
Fink, Paul Jacob B.A., M.A. ( <i>Ohio State University</i> )	Allentown
Gilbert, Harry Irman A.B., M.A. ( <i>Pennsylvania State College, University of Pittsburgh</i> )	Boyertown
Harrison, Doris Audrey A.B. ( <i>Ohio University</i> )	Palmerton
Hartman, Dorothy Pauline A.B., M.A. ( <i>Muhlenberg College, Columbia University</i> )	Allentown
Heimbold, Katharine Rita	Arlington, N. J.
Heller, Estella Ruth B.S. ( <i>Muhlenberg College</i> )	Pen Argyl
Keiper, Frances Jacobs B.A. ( <i>Moravian College for Women</i> )	Hellertown
Kelchner, Mabell B.S. ( <i>Albright College</i> )	Fleetwood
Keleher, John Joseph Ph.B. ( <i>Muhlenberg College</i> )	Bethlehem
Kinney, Colleen Barbara	Bethlehem
Kooker, Frances Elaine B.A. ( <i>Ursinus College</i> )	Quakertown

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Krauss, Mildred Charlotte B.S. ( <i>West Chester State Teachers College</i> )	Centre Valley
Kurth, Gabriele Dorothea Maria	Allentown
Levitsky, Anna Puschock B.A. ( <i>Pennsylvania State College</i> )	Nesquehoning
McDowell, Elsie M. B.A., M.A. ( <i>Moravian College for Women, Lehigh University</i> )	Bethlehem
Mechalakos, Mary B.S. ( <i>Rider College</i> )	Easton
Moser, William Gustave A.B. ( <i>Muhlenberg College</i> )	Nazareth
Mumbauer, Eleanor Dengler B.A., M.A. ( <i>Moravian College for Women, Lehigh University</i> )	Bethlehem
Nagle, Paul Arthur B.S. ( <i>Muhlenberg College</i> )	Allentown
Nehf, Charles Henry B.S. ( <i>Muhlenberg College</i> )	Allentown
Platoff, Zena B.S. ( <i>Drexel Institute</i> )	Quakertown
Rea, Kathleen B.A. ( <i>New Jersey College for Women</i> )	Bethlehem
Reichard, Robert Brighthill B.S., M.A. ( <i>Kutztown State Teachers College, Lehigh University</i> )	Nazareth
Riley, Anna Tully	Bethlehem
Ruth, Evelyn Velma	Hellertown
Schlegel, Martha Marie B.A., M.A. ( <i>Moravian College for Women, Lehigh University</i> )	Allentown
Schlenker, Herbert John B.S. ( <i>Albright College</i> )	Kutztown
Sinclair, A. Mary A.B. ( <i>Albright College</i> )	Akron
Stever, Mary M. B.S. ( <i>Kutztown State Teachers College</i> )	Quakertown
Strauss, Mildred Kline A.B. ( <i>Cedar Crest College</i> )	Emmaus
Weidner, Camille Reuben B.S. ( <i>Muhlenberg College</i> )	Bethlehem
Weinhofer, Augustine Carl A.B. ( <i>Muhlenberg College</i> )	Nazareth
Werner, Henrietta A. B.S. ( <i>Cedar Crest College</i> )	Nazareth
Wetzel, Verda May A.B. ( <i>Albright College</i> )	Lehighton
Young, Mary Jane B.M. in Ed. ( <i>Syracuse University</i> )	Bethlehem

## STUDENTS

## TRAINEES

Curriculum abbreviations are explained in the preceding pages.

Name	Curriculum and Term	Dates of Attendance
Alexander, Robert Morris	B60-1,2	Aug. 7-Dec. 11
Allegar, Edwin Morris	B60-1,2	Aug. 7-Jan. 27
Ames, Ben Joynes	B60-1,2	Aug. 7-Jan. 27
Arcovio, Louis Charles	B60-1,2	Aug. 7-Jan. 27
Babyak, Andrew	B60-1	Aug. 7-Sept. 11
Baker, Rex McClain	B60-1,2	Aug. 7-Jan. 27
Balwierczak, Frank Edward	N10-1	Aug. 7-Oct. 5
Barker, Robert Wyndham	B60-1	Aug. 7-Oct. 28
Baron, Arthur Matthew	B60-1,2	Aug. 7-Jan. 27
Barton, Earl Lyscomb	B60-1,2	Aug. 7-Jan. 27
Bertics, John Paul	B60-1,2	Aug. 7-Jan. 27
Besecker, Roger Franklin, Jr.	N10-1; N30-2	Aug. 7-Jan. 27
Blumenthal, Saul Morton	B60-1,2	Aug. 7-Jan. 27
Bobbitt, Percy Jackson	B60-1,2	Aug. 7-Jan. 27
Bond, Robert Naile	B60-1,2	Aug. 7-Jan. 27
Bopst, John H.	N10-1; N30-2	Aug. 7-Jan. 27
Bower, Jack Grover	B60-1,2	Aug. 7-Jan. 27
Breakiron, Richard C.	B60-1,2	Aug. 7-Jan. 27
Breuninger, William Richard	B60-1,2	Aug. 7-Jan. 27
Brosovic, Thomas A., Jr.	B60-1,2	Aug. 7-Jan. 27
Bubb, Herman Winfred	N10a-1; N30a-2	Aug. 7-Jan. 27
Buchanan, John Elton	B60-1	Aug. 7-Sept. 11
Burke, Gerald Aaron	N10a-1; N30a-2	Aug. 7-Jan. 27
Burkett, Paul Watkin	B60-1,2	Aug. 7-Jan. 27
Bushong, Arthur William, Jr.	N10-1; N30-2	Aug. 7-Jan. 27
Campbell, Wallace Hall	B.E.1-1	Jan. 10-Apr. 1
Camper, Jimmy Edwin	N10a-1; N30a-2	Aug. 7-Jan. 27
Carroll, Robert Francis	B60-1,2	Aug. 7-Jan. 27
Carter, David Irvin	B60-1	Aug. 7-Oct. 28
Cassler, Luther Henry	B60-1,2	Aug. 7-Jan. 27
Catlett, John Walker Carter, Jr.	B60-1,2	Aug. 7-Jan. 27
Charcalla, Richard George	B60-1,2	Aug. 7-Jan. 27
Chiera, Jacob Andrew	B.E.1-1	Jan. 10-Apr. 1
Christiansen, Arthur Claus	B60-1,2	Aug. 7-Jan. 27
Cicone, Anthony Francis	B.E.1-1	Jan. 10-Apr. 1
Cohen, Marshall Harris	B.E.1-1,2	Jan. 10-June 30
Colbs, Marvin	B.E.1-1,2	Jan. 10-June 30
Comer, Asher	B.E.1-1	Jan. 10-Apr. 1
Conn, Robert Alexander	B.E.1-1,2	Oct. 11-Apr. 1
Cowan, Henry Shaw, Jr.	B.E.1-1	Jan. 10-Apr. 1
Coyne, Robert Joseph	B60-1,2	Aug. 7-Jan. 27
Crickard, Peter M.	B60-1	Aug. 7-Sept. 11
Curia, Joseph R.	N10-1; N30-2	Aug. 7-Jan. 27
Curtis, Robert Linwood	B.E.1-1	Jan. 10-Apr. 1
Davis, John Owens	B60-1,2	Aug. 7-Jan. 27
Deibert, Thomas William	B60-1,2	Aug. 7-Jan. 27
DeLaney, Walter Ross	B60-1	Aug. 7-Sept. 22
DelPapa, Charles Bernard	B60-1	Aug. 7-Oct. 5
DiFilippo, Thomas Joseph	B60-1,2	Aug. 7-Dec. 11
Dillon, Thomas Bernard	B60-1,2	Aug. 7-Jan. 27

Doran, John H.	N10a-1	Aug. 7-Oct. 5
Downing, Joseph Herbert	B60-1,2	Aug. 7-Jan. 27
Dubble, George	B60-1,2	Aug. 7-Jan. 27
Emerick, Richard Walton	B60-1,2	Aug. 7-Dec. 11
Erickson, Cornelius James	B.E.1-1	Jan. 10-Apr. 1
Escalada, Lloyd	N10a-1	Aug. 7-Oct. 28
Feltman, Robert Ferree	B60-1,2	Aug. 7-Jan. 27
Fink, Harold Byron	B60-1,2	Aug. 7-Jan. 27
Finstein, Martin David	N10-1; N30-2	Aug. 7-Jan. 27
Fisher, Herbert Burton	B.E.1-1	Jan. 10-Apr. 1
Flax, Richard Jerrold	B60-1	Aug. 7-Oct. 28
Fleming, Boyce C., Jr.	B60-1	Aug. 7-Oct. 5
Fleming, David Alexander	B60-1	Aug. 7-Sept. 11
Flesher, Wiley Lee	B60-1	Aug. 7-Oct. 28
Foderaro, Anthony Harolde	B.E.1-1,2	Oct. 11-Apr. 1
Fontana, Michael	N10a-1	Aug. 7-Oct. 28
Frank, Louis, Jr.	B.E.1-1,2	Jan. 10-June 30
Freedman, Arthur Raymond	B.E.1-1	Jan. 10-Apr. 1
Fuller, Daniel Alfred	N10-1; N30-2	Aug. 7-Jan. 27
Gallagher, Philip	B60-1,2	Aug. 7-Jan. 27
George, Harold Franklin	B60-1,2	Aug. 7-Jan. 27
Gibson, Robert Leone	B60-1,2	Aug. 7-Jan. 27
Gilbert, Ennis Cecil, Jr.	B60-1	Aug. 7-Sept. 11
Gilbert, Samuel Theodore	B.E.1-1	Jan. 10-Apr. 1
Gordon, Haralson	B60-1,2	Aug. 7-Dec. 11
Greenfield, Arthur Cooper	B.E.1-1	Jan. 10-Apr. 1
Grettenberger, Karl Mumford	B60-1,2	Aug. 7-Jan. 27
Grimm, Bobby Marshall	B.E.1-1,2	Jan. 10-June 30
Gulley, William Grady	B.E.1-1	Jan. 10-Apr. 1
Haenn, Paul Robert	B60-1,2	Aug. 7-Jan. 27
Hall, Robert Swart	B.E.1-1	Jan. 10-Apr. 1
Halpern, Benjamin Arthur	B.E.1-1	Jan. 10-Apr. 1
Hammond, William Wallace, Jr.	B60-1,2	Aug. 7-Jan. 27
Harle, Louis Aloysius, Jr.	B.E.1-1	Jan. 10-Apr. 1
Hart, Richard L.	B60-1,2	Aug. 7-Jan. 27
Hartman, Earl Richard	B60-1,2	Aug. 7-Jan. 27
Hassinger, Earl Robert	B60-1,2	Aug. 7-Dec. 11
Hays, Robert Vernon	B60-1	Aug. 7-Sept. 11
Heberlig, Raymond Dale	B60-1,2	Aug. 7-Jan. 27
Heimbach, Gordon Schaeffer	B60-1	Aug. 7-Sept. 11
Heller, Adam Sacks	B60-1	Aug. 7-Oct. 28
Hersh, Joseph Sholom	B.E.1-1	Jan. 10-Apr. 1
Hiltner, Samuel Wiedner	B60-1,2	Aug. 7-Jan. 27
Hoffman, Walter Arthur, Jr.	B.E.1-1,2	Jan. 10-June 30
Hogan, Walter Jennings, Jr.	B.E.1-1	Jan. 10-Apr. 1
Hohman, Carl, Jr.	B60-1	Aug. 7-Oct. 5
Holder, Reeves Aaron	B60-1	Aug. 7-Sept. 11
Holt, Charles Augustus	B60-1	Aug. 7-Oct. 5
Hovis, Jack Goodwin	B60-1,2	Aug. 7-Jan. 27
Hubbard, William Franklin	B.E.1-1	Jan. 10-Apr. 1
Isakson, William John	B.E.1-1	Jan. 10-Apr. 1
Jacobs, Harold Stanley	B.E.1-1	Jan. 10-Apr. 1
Jessel, Anthony John	B.E.1-1	Jan. 10-Apr. 1
Jett, Lewis Archie, Jr.	B.E.1-1,2	Oct. 11-Apr. 1
John, Edward Clarence, Jr.	B60-1,2	Aug. 7-Jan. 27
Johns, Joseph	B60-1,2	Aug. 7-Jan. 27

## S T U D E N T S

Jordan, James Thomas	B.E.1-1	Jan. 10-Apr. 1
Kartman, Leslie, M.	B.E.1-1	Jan. 10-Apr. 1
Keller, Donald Lee	B.E.1-1	Jan. 10-Apr. 1
Keller, Frank John	B.E.1-1	Jan. 10-Apr. 1
Kirkman, William III	B.E.1-1	Jan. 10-Apr. 1
Klaproth, James J.	B60-1,2	Aug. 7-Jan. 27
Klingelhoefer, William Joseph	B60-1,2	Aug. 7-Jan. 27
Koch, Alfred Louis	B.E.1-1	Jan. 10-Apr. 1
Kunkel, Guy Allan	B.E.1-1	Jan. 10-Apr. 1
Kurtak, Joseph Albert	B.E.1-1	Jan. 10-Apr. 1
LaLonde, Emil Edward, Jr.	N10a-1	Aug. 7-Oct. 5
Landreth, Robert Nelson, Jr.	B60-1,2	Aug. 7-Jan. 27
LaRosa, Russell Francis	B.E.1-1	Jan. 10-Apr. 1
Laylon, Randel Charles	B60-1,2	Aug. 7-Jan. 27
Leinbach, Richard Benton	B60-1,2	Aug. 7-Jan. 27
Liberman, Harry	B.E.1-1,2	Jan. 10-June 30
Link, James Melvin	N10-1; N30-2	Aug. 7-Jan. 27
Lipson, Joseph Isaac	B60-1,2	Aug. 7-Jan. 27
Logan, John H.	B60-1,2	Aug. 7-Jan. 27
Long, William Kenneth	B60-1,2	Aug. 7-Jan. 27
Macht, Paul Edward	B60-1,2	Aug. 7-Jan. 27
Mallin, Morton Lewis	B.E.1-1	Jan. 10-Apr. 1
Maloof, Edward George	B60-1	Aug. 7-Oct. 5
Marcus, Harold	B.E.1-1,2	Oct. 11-Apr. 1
Mark, Philip David	B60-1,2	Aug. 7-Jan. 27
Markel, Robert Koplin	B60-1	Aug. 7-Oct. 28
Marshall, Samuel Reid	B60-1	Aug. 7-Oct. 5
Martin, Kenneth Comp	B.E.1-1	Jan. 10-Apr. 1
Martin, Robert William	N10-1	Aug. 7-Oct. 5
Mazanowski, Lloyd G.	B60-1,2	Aug. 7-Jan. 27
McCall, John Marshall	B.E.1-1	Jan. 10-Apr. 1
McCarley, John Wallace, Jr.	B60-1,2	Aug. 7-Jan. 27
McClernan, Ralph Albert	B.E.1-1	Jan. 10-Apr. 1
McDonough, John Paul, Jr.	B60-1,2	Aug. 7-Jan. 27
McGeever, Andrew Richard	B.E.1-1	Jan. 10-Apr. 1
McGinnes, Edgar Allan, Jr.	B.E.1-1	Jan. 10-Apr. 1
McKinney, Robert William	N10-1	Aug. 7-Oct. 5
McLellan, James Donald	B60-1,2	Aug. 7-Jan. 27
Meanor, William Herron	B60-1,2	Aug. 7-Jan. 27
Meier, Emil Ernest, Jr.	N10-1	Aug. 7-Oct. 3
Merritt, Archie Joseph	B60-1,2	Aug. 7-Jan. 27
Michael, John Henry, Jr.	N10-1; N30-2	Aug. 7-Jan. 27
Miller, Harry H.	B.E.1-1	Jan. 10-Apr. 1
Mills, James Marvin	N10a-1; N30a-2	Aug. 7-Dec. 21
Mirarchi, Marshall Joseph	B60-1,2	Aug. 7-Jan. 27
Missler, Earl Benjamin	B60-1,2	Aug. 7-Jan. 27
Mordan, Jack LeRoy	N10-1; N30-2	Aug. 7-Jan. 27
Morgan, David Pollock	B60-1,2	Aug. 7-Jan. 27
Morris, John Robert, Jr.	B60-1,2	Aug. 7-Jan. 27
Mosemann, David Weaver	N10-1	Aug. 7-Oct. 28
Musgrove, Lawrence Craddock	N10a-1	Aug. 7-Oct. 5
Nave, Don Odell	B.E.1-1,2	Oct. 11-Apr. 1
Neiman, William Edward	N10-1	Aug. 7-Oct. 28
Neely, Harold LeRoy	B60-1,2	Aug. 7-Jan. 27
Newborg, Herbert Smith	B60-1,2	Aug. 7-Dec. 23
Olesky, George J.	B60-1,2	Aug. 7-Jan. 27

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O'Mara, William Charles	B60-1,2	Aug. 7-Jan. 27
Orndorf, James Frederick	B.E.1-1	Jan. 10-Apr. 1
Padezanin, George	N10a-1	Aug. 7-Oct. 28
Paiolletti, Angelo Francis	N10-1; N30-2	Aug. 7-Jan. 27
Parker, Thorburn Abbott	B.E.1-1	Jan. 10-Apr. 1
Paules, Clair Eugene	N10-1; N30-2	Aug. 7-Jan. 27
Peresman, Edgar Verne	B60-1,2	Aug. 7-Jan. 27
Perlman, Clifford	B.E.1-1	Jan. 10-Apr. 1
Peterson, Theodore Robert	B60-1,2	Aug. 7-Nov. 28
Prutsman, Jack Damon	B60-1,2	Aug. 7-Dec. 5
Putnam, David Wiles	B60-1,2	Aug. 7-Jan. 27
Quinley, Henry Clay	B60-1,2	Aug. 7-Jan. 27
Quintin, Walter Pfister, Jr.	B.E.1-1,2	Jan. 10-June 30
Rahter, Paul Donald	B.E.1-1,2	Oct. 11-Apr. 1
Ralston, George S.	N10a-1; N30a-2	Aug. 7-Jan. 27
Rankin, Harry Andrew	B60-1,2	Aug. 7-Jan. 27
Rauscher, John Meradith	B60-1,2	Aug. 7-Jan. 27
Redington, Paul Graham	B.E.1-1	Jan. 10-Apr. 1
Reese, Stanley M.	B60-1,2	Aug. 7-Dec. 11
Reich, Mayer Samuel	B.E.1-1,2	Jan. 10-June 20
Reiss, Theodore	B60-1,2	Aug. 7-Jan. 27
Rhoades, Alan Leroy	B60-1	Aug. 7-Oct. 28
Rinearson, Glen Oakley	N10a-1	Aug. 7-Oct. 5
Robinson, John Carroll	N10a-1	Aug. 7-Oct. 5
Rosen, Morton	B.E.1-1,2	Jan. 10-June 30
Ross, Lawrence Peter	B60-1,2	Aug. 7-Jan. 27
Rossi, John Charles	B60-1,2	Aug. 7-Jan. 27
Roucroft, Frank Conway	N10-1; N30-2	Aug. 7-Jan. 27
Rubenstein, Martin Julius	B.E.1-1	Jan. 10-Apr. 1
Saraceno, Carmen	B60-1	Aug. 7-Oct. 28
Sbaraglia, Vgo Ezio	B60-1,2	Aug. 7-Jan. 27
Schiffer, Calvin Lewis	N10-1; N30-2	Aug. 7-Jan. 27
Schlicht, Charles Joseph	B.E.1-1,2	Jan. 10-June 30
Schwab, Albert Leon	B.E.1-1	Jan. 10-Apr. 1
Seaman, Andrew W., Jr.	N10-1; N30-2	Aug. 7-Jan. 27
Secoura, Ralph James	B60-1,2	Aug. 7-Jan. 27
Seibert, Edward Harry	B.E.1-1	Jan. 10-Apr. 1
Sharadin, James Edward	B60-1,2	Aug. 7-Jan. 27
Short, John Settle	N10-1,2	Aug. 7-Dec. 11
Shtasel, Albert	B.E.1-1	Jan. 10-Apr. 1
Shulman, William Joseph	B.E.1-1	Jan. 10-Apr. 1
Shumosic, Leon John	N10-1; N30-2	Aug. 7-Jan. 27
Shupe, Daniel Wertz	N10a-1; N30a-2	Aug. 7-Jan. 27
Simon, Walter Marion	N10-1; N30-2	Aug. 7-Jan. 27
Simpson, Earl Raymond, Jr.	B60-1,2	Aug. 7-Jan. 27
Slosky, Edward Andrew	B60-1	Aug. 7-Oct. 5
Smeltzer, Richard Edward	B60-1,2	Aug. 7-Jan. 27
Smith, Edgar William, Jr.	N10a-1	Aug. 7-Oct. 28
Smith, Isaac Seldon	N10-1	Aug. 7-Sept. 11
Smith, James Donald	B60-1,2	Aug. 7-Jan. 27
Smith, John Clifford, Jr.	B60-1,2	Aug. 7-Jan. 27
Sniderman, Milton	B.E.1-1	Jan. 10-Apr. 1
Snook, Robert Samuel	B60-1,2	Aug. 7-Dec. 11
Soliday, Luther Carl	N10a-1	Aug. 7-Oct. 28
Steenson, Andrew Charles	B60-1,2	Aug. 7-Jan. 27
Stein, Paul Joseph	B60-1	Aug. 7-Sept. 11

## S T U D E N T S

Stiles, Richard Lehman	B60-1,2	Aug. 7-Jan. 27
Stiles, Robert Leslie	B60-1,2	Aug. 7-Jan. 27
Stright, Tracy Marvin	N10-1	Aug. 7-Oct. 5
Stringer, Howard Frederick	B.E.1-1	Jan. 10-Apr. 1
Sullivan, James Patrick	B60-1,2	Aug. 7-Jan. 27
Sullivan, Robert Chittenden	B60-1	Aug. 7-Sept. 11
Sully, Henry Herbert, Jr.	B60-1	Aug. 7-Oct. 28
Swantek, John Edward	B60-1,2	Aug. 7-Jan. 27
Sweeny, James Johann	B60-1,2	Aug. 7-Jan. 27
Tabor, Clarence John, Jr.	B60-1,2	Aug. 7-Jan. 27
Tacka, Melvin Blase	B.E.1-1	Jan. 10-Apr. 1
Tavianini, Armond Victor	B60-1,2	Aug. 7-Jan. 27
Taylor, Raymond Earl	B60-1,2	Aug. 7-Jan. 27
Thomas, Charles Edward	B60-1,2	Aug. 7-Dec. 11
Thompson, Robert John	B60-1,2	Aug. 7-Jan. 27
Tidd, Charles Edward, Jr.	B.E.1-1,2	Oct. 11-Apr. 1
Tilghman, Henry Lee	B.E.1-1,2	Oct. 11-Apr. 1
Trovalli, Harry, Jr.	N10-1	Aug. 7-Oct. 28
Tull, Robert Cassan	B.E.1-1,2	Oct. 11-Apr. 1
Twentey, Roy Kenneth	B.E.1-1	Jan. 10-Apr. 1
Unger, Carl Jack	B60-1	Aug. 7-Oct. 5
Upchurch, Stanley Hubbard, Jr.	B.E.1-1	Jan. 10-Apr. 1
Vannicelli, David Emilio, Jr.	N10a-1; N30a-2	Aug. 7-Dec. 21
Vishabazoon, Philip Aram	B.E.1-1	Jan. 10-Apr. 1
vonStorch, Kenneth Eugene	B60-1	Aug. 7-Sept. 30
Voyzey, Donald Clair	B60-1	Aug. 7-Oct. 5
Walker, William Washington	B.E.1-1	Jan. 10-Apr. 1
Walsh, William Walker	B.E.1-1	Jan. 10-Apr. 1
Weinstock, Milton	B.E.1-1,2	Jan. 10-June 30
Weisman, Jerome	B.E.1-1	Jan. 10-Apr. 1
Weiss, Gerald	B.E.1-1	Jan. 10-Apr. 1
Weiss, Stanley Alan	B.E.1-1,2	Jan. 10-June 30
Wenzowski, Bernard	N10-1	Aug. 7-Oct. 5
Wexler, Sidney	B.E.1-1	Jan. 10-Apr. 1
Weyrich, Carroll Melvin	B.E.1-1	Jan. 10-Apr. 1
White, Ray Edward, Jr.	B60-1,2	Aug. 7-Jan. 27
White, Robert McKay	B60-1,2	Aug. 7-Jan. 27
White, William Farley	B60-1,2	Aug. 7-Jan. 27
Whitesman, Norman Irvin	B.E.1-1	Jan. 10-Apr. 1
Whittington, David Kelsey	B.E.1-1	Jan. 10-Apr. 1
Wick, Charles David	B60-1,2	Aug. 7-Jan. 27
Wieder, Robert Edward	N10-1; N30-2	Aug. 7-Jan. 27
Williams, Arthur Stanley	N10-1	Aug. 7-Sept. 11
Williams, Everett Waldo, Jr.	B60-1,2	Aug. 7-Jan. 27
Williams, George Christopher	B.E.1-1,2	Jan. 10-June 30
Williams, John Foreman	B.E.1-1	Jan. 10-Apr. 1
Woessner, Donald Joseph	B60-1	Aug. 7-Sept. 11
Wojciechowski, Eugene Joseph	N10-1; N30-2	Aug. 7-Jan. 27
Wood, Matthew William	B60-1,2	Aug. 7-Jan. 27
Woods, John Erwin	B60-1,2	Aug. 7-Jan. 27
Woolman, Richard Hulme	B.E.1-1	Jan. 10-Apr. 1
Yerg, Kenneth Gideon	B60-1,2	Aug. 7-Jan. 27
Yuch, Albert John	B60-1,2	Aug. 7-Jan. 27
Zarow, Sidney	N10a-1; N30a-2	Aug. 7-Dec. 11
Zeller, Frederick	B.E.1-1	Jan. 10-Apr. 1
Zorn, William Austin	N10a-1	Aug. 7-Oct. 28

**SUMMARY OF STUDENTS BY CLASSES AND CURRICULA****SUMMER SEMESTER, 1944**

Undergraduates	Seniors	Juniors	Sophomores	Second Semester Freshmen	New Freshmen	General College Division	Special Students	Total
Arts and Science.....	3	5	8	4	17	....	1	38
Business Administration ....	5	10	3	2	10	....	....	30
Chemical Engineering .....	13	9	14	2	25	....	....	63
Chemistry .....	1	1	1	1	3	....	....	7
Civil Engineering .....	2	3	....	1	14	....	....	20
Electrical Engineering .....	6	6	7	7	15	....	....	41
Engineering .....	....	....	1	1	....	....	....	2
Engineering Physics .....	1	1	2	2	4	....	....	10
Industrial Engineering .....	1	2	3	1	3	....	....	10
Mechanical Engineering ....	4	5	10	6	24	....	....	49
Metallurgical Engineering..	4	2	1	....	3	....	....	10
Mining Engineering .....	3	....	....	....	2	....	....	5
General College Division..	....	....	....	....	....	5	....	5
Undergraduate Women .....	....	....	....	....	....	....	....	3
<b>Total .....</b>	<b>43</b>	<b>44</b>	<b>50</b>	<b>27</b>	<b>120</b>	<b>5</b>	<b>1</b>	<b>293</b>

## STUDENTS

FALL SEMESTER, 1944-45

	Undergraduates		Sophomores	Second Semester Freshmen	New Freshmen	General College Division	Special Students	Total
	Seniors	Juniors						
Arts and Science.....	5	10	9	14	11	...	1	50
Business Administration ....	6	5	8	14	6	...	...	39
Chemical Engineering .....	8	9	4	16	10	...	...	47
Chemistry .....	2	...	...	1	1	...	...	4
Civil Engineering .....	5	2	3	13	8	...	...	31
Electrical Engineering .....	6	6	6	14	7	...	...	39
Engineering Physics .....	1	2	3	4	3	...	...	13
Industrial Engineering .....	3	2	2	2	8	...	...	17
Mechanical Engineering ....	3	6	9	22	36	...	...	76
Metallurgical Engineering..	3	...	2	4	2	...	...	11
Mining Engineering .....	...	...	...	2	1	...	...	3
General College Division..	...	...	...	...	...	9	...	9
Total .....	42	42	46	106	93	9	1	339

**SPRING SEMESTER, 1944-45**

Undergraduates	Seniors	Juniors	Sophonores	Second Semester Freshmen	New Freshmen	General College Division	Special Students	Total
Arts and Science.....	8	10	12	11	5	...	1	47
Business Administration ....	9	5	6	10	5	...	...	35
Chemical Engineering .....	6	9	10	8	10	...	...	43
Chemistry .....	1	1	1	...	...	...	...	3
Civil Engineering .....	6	3	3	7	4	...	...	23
Electrical Engineering .....	4	8	12	5	4	...	...	33
Engineering Physics .....	2	7	1	3	...	...	...	13
Industrial Engineering .....	1	2	2	8	1	...	...	14
Mechanical Engineering ....	4	7	14	28	8	...	...	61
Metallurgical Engineering..	3	...	3	2	1	...	...	9
Mining Engineering .....	...	...	...	1	1	...	...	2
General College Division..	...	...	...	...	...	10	...	10
Total .....	42	47	70	81	42	10	1	293

**SUMMARY FOR THE YEAR, 1944-45**

Graduate Students (3 semesters, less duplications) .....	119
Undergraduate Students (3 semesters, less duplications) .....	484
Adult Education (3 semesters, less duplications) .....	77
Students in Summer Sessions.....	48
 Total .....	728
Total, less duplications.....	708

**GEOGRAPHICAL DISTRIBUTION OF STUDENTS, 1944-45**

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California .....	2
Connecticut .....	9
Delaware .....	3
District of Columbia.....	3
Florida .....	1
Georgia .....	1
Indiana .....	1
Maryland .....	7
Massachusetts .....	3
Michigan .....	1
Minnesota .....	1
Missouri .....	1
New Jersey .....	94
New York .....	97
North Carolina .....	1
Ohio .....	5
Oklahoma .....	1
Pennsylvania .....	456
South Carolina .....	1
Virginia .....	2
Washington .....	1
West Virginia .....	2
Wisconsin .....	1
Bahamas .....	1
Brazil .....	1
China .....	2
Colombia .....	4
Cuba .....	2
Italy .....	1
Peru .....	1
Turkey .....	1
Venezuela .....	2

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